UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

MARCH, 1888.

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PREPARED UNDER THE DIRECTION OF
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1888.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the Office of the Chief Signal Officer, Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of March, 1888.

	Name of vessel.	Captain.
Br.	s. s. Ailsa	Capt. John Evans.
Am.	Alamo	S. Risk.
Br.	Alaska	Geo. S. Murray.
	Algiers	J. B. Percy.
	Alcides	W. Rolls.
Ger.	Aller	H. Christoffers.
Br.	Alps	J. W. Tobin.
	Alsatia	J. Brown.
	Alvena	F. McKay.
	Alvo	D. Williams.
	Andes	Clinkskel.
Ger.	Atlantic	A. Witte.
Br.	Athos	H. Low.
	Arabic	W. M. Smith.
	Arizona	S. Brooks.
	Aurania	W. H. P. Hains.
	Australia	A. McRitchie.
Ger.	Australia	G. Franck.
Br.	Ayrshire	D. Jenkins
	Barracouta	Robert Hubbard.
	Barrowmore	John Inch.
	Bavarian	Robt. Leask.
	Beechville	T. W. Watson.
	Bengore Head	J. R. Brady.
	Bothnia	Thomas Dutton.
	Bohemia	R. Rordell.
	Brittania	J. Parazoli.
	Britannic	H. Parsell.
	Breakwater	J. E. Dale.
	British King	John Kelly.
	British Prince	S. Nowell.
	British Queen	R. Wills.
	Brooklyn City	W. Fitt.
	Buffalo	J. H. Malet.
Fr.	Burgundia	F. Dulac.
Br.	Canada	J. Robinson.
	Caribbean	H. Daniel.
Span.	Carolina	
Br.	Catalonia	Edward Wylie.
	Celtic	P. J. Irving.
	Cervin	Sinclair Hughson
	Cephalonia	Henry Walker.
Fr.	Chateau Leoville	M. Le Chapelain.
Br.	Chicago	J. W. Jones.
	Circassia	A. Campbell.
Am.	City of Augusta	J. W. Catherine
Br.	City of Alexandria	John Deakin.
	City of Berlin	F. S. Land.
	City of Chester	A. Lewis.
	City of Chicago	Fred Watkins.
Am.	City of Dallas	C. W. Read.
Br.	City of Lincoln	F. G. Fry.
Am.	City of Para	L. Dexter.
Br.	City of Richmond	A. Redford.
Am.	City of San Antonio	J. Wilder.
Br.	City of Washington	J. W. Reynolds.
Am.	Colon	F. Henderson.
Br.	Concordia	A. McLean.
	Counsellor	W. Lang.
	Croma	W. P. Lord.
Belg.	DeRuyter	J. J. Brarens.
Br.	Denmark	R. S. Rigby.
	Devonia	W. G. Crockhart.
	Discoverer	Thomas Hughes.
	Dorian	J. McKeague.
	Duke of Buckingham	T. C. Burnside.
Dtch.	Edam	H. C. v. d. Zee.
Br.	Edith Godden	J. H. Bennett.
	Egypt	J. Sumner.
Ger.	Elder	H. Baur.
	Elbe	G. Meyer.
Br.	El Monte	J. W. Hawthorn
Am.	El Paso	H. S. Quick.
Br.	Elpis	F. Burnett.
Ger.	Ems	Th. Jüngst.
Br.	England	A. T. Heeley.
	Erin	Wm. Tyson.
	Etruria	T. Cook.
	Ethiopia	John Wilson.
	Eureka	R. B. Quick.
Ger.	Fulda	R. Ringk.
Br.	Furnessia	J. Hedderwick.
	Galileo	R. T. Jones.
Ger.	Gellert	W. Kuhlewein.
Br.	Germanic	B. Gleadell.
Ger.	Gluckauf	A. Buhner.
Br.	Gothenburg	James Harrison.

	Name of vessel.	Captain.
Ger.	s. s. Gothia	Capt. H. Bauer.
Br.	Grecian	C. E. LeGallais.
	Helvetia	G. Cochran.
Ger.	Hermann	A. Kohlman.
Br.	Hexham	T. D. Adams.
	Holland	Thos. Foote.
	Hondo	J. Brownrigg
Am.	Hudson	H. B. Freeman.
Br.	India	J. Jameson.
Am.	Indiana	W. J. Bogga.
Br.	Iowa	E. W. Owens.
	Istrian	T. H. Fox.
	Italy	W. Pearce.
	Knickerbocker	F. Rembie.
Fr.	La Bourgogne	E. Franguel.
	La Bretagne	M. de'Jousselin.
	La Champagne	L. Boyer.
	La Normandie	G. de Kersabiec.
	Lahn	H. Hellmers.
Ger.	Lake Ontario	H. Campbell.
Br.	Lake Superior	W. Stewart.
Am.	Lampassas	M. B. Crowell.
Dtch.	Leerdam	G. Stenger.
Br.	Llandaff City	T. H. Gore.
	Lord Gough	E. M. Hughes.
Am.	Lorenzo D. Baker	Warren F. Wiley
	Maine	H. Murrell.
	Manhattan	Frank Stevens.
Br.	Manitoban	Wm. Dunlop.
	Marengo	T. M. Irwin.
	Marsala	N. Maas.
	Martello	W. Abbott.
	Mentmore	C. W. Simpson.
	Mercia	John Taylor.
	Michigan	R. Griffiths.
	Michigan	S. Walters.
	Montana	W. H. Williams
	Moravia	Kopff.
	Muriel	G. S. Locke.
	Nantasket	E. A. Richardson
	Nasmyth	Thos. T. Farrell.
Span.	Navarro	S. de Aldecocea.
Belg.	Nederland	A. J. Griffin.
Br.	Nessmore	G. Elliott.
	Nevada	J. A. R. Cushing.
Am.	Nueces	J. Bolger.
	New Orleans	T. P. C. Halsey.
	Newport	W. G. Shackford.
	New York	Geo W. Mason.
Belg.	Noordland	H. E. Nickels.
Br.	Norseman	R. Williams.
	Norwegian	R. Carruthers.
Ger.	Nürnberg	H. Engelhart.
Br.	Ohio	R. W. Sargent.
	Oregon	H. C. Williams.
	Oranmore	B. Jones.
	Orinoco	J. S. Garvin.
	Oxford	W. Janes.
	Pavonia	A. McKay.
Belg.	Pennland	Rud Weyer.
Br.	Pennsylvania	E. B. Thomas.
	Persian Monarch	R. N. Bristow.
Am	Philadelphia	Samuel Hess.
Belg.	Pieter de Coninck	E. Smit.
Ger.	Polaris	John Schade.
	Polynesia	A. Kühn.
Br.	Republic	H. Davison.
Belg.	Rhaetia	H. Vogelgesang.
Ger.	Rhynland	J. C. Jamison.
Br.	Richmond Hill	A. Hyde.
Am.	Rio Grande	Jas. F Lewis.
Br.	River Garry	J. Scott.
	Roman	E. Maddox.
Belg.	Rosse	T. Henning.
Dtch.	Rotterdam	A. Potjer.
Ger.	Rugia	R. Karlowa.
Br.	Samana	H. Bermpohl.
Ger.	Saale	H. Richter.
Br.	Salerno	B. H. Rogers.
	Sarnia	J. Gibson.
	Samara	Geo. Dickson.
	Saxmundham	F. M. Milne.
Br.	Scandinavian	John Park.
Dtch.	Schiedam	K. Menconides.
Br.	Scholar	J. Carbishley.
Span.	Serra	F. de Luzaraga.
Br.	Servia	H. McKay.

	Name of vessel.	Captain.
Br.	s. s. Sidonian	Capt. B. Jamie
	Spain	W. A. Gri
	State of Georgia	G. Moodie.
	State of Indiana	A. Ritchie
	State of Nebraska	A. G. Bran
	State of Nevada	J. A. Stew
	State of Pennsylvania	A. J. A. Ma
	State of Texas	Gilbert Wi
	Stockholm City	W. Thomp
	Saint Ronans	H. Campbe
	Strabo	Ang. Math
	Surrey	R. Griffith
	Sussex	J. P. O'Cal
Belg.	Switzerland	J. Ueberw
Dan.	Thingvalla	S. T. H. La
Br.	Thornhill	James Wi
Span.	Tomas Brooks	E. F. Cand
Br.	Tower Hill	F. Archer.
Ger.	Trave	W. Willig
Br.	Trinidad	W. J. Fra
	Umbria	W. McMic
Belg.	Vaderland	C. H. Gra
Br.	Vancouver	C. J. Lind
	Viola	L. Murray
Belg.	Waesland	H. Ruschm
Ger.	Wandrahm	C. W. Rob
Belg.	Westernland	Com. W. G. Ran
Ger.	Wieland	Capt. A. Albers.
Br.	Winston	J. B. Mill
	Wyanoke	B. Boaz.
	Wyoming	C. L. Rigb
Dtch.	Zaandam	W. Pauses
	Zeeland	E. Benco.
	Sailing vessels.	
Am.	bg. Abbie Clifford	D. W. Ster
Am.	bk. Alice	W. G. Kai
	schr. Anita	C. F. A. Sa
	bg. Arcot	J. W. Cate
	bk. Artemis	B. B Mos
Br.	sp. C. S. Whitney	O. B. Mer
Br.	bkt. Diadem	J. Crasso.
Br.	bk. Elgin	W. H. Rob
Am.	schr. Fastina	R. Philbro
Am.	bkt. Harriet S. Jackson	W. T. Bac
Dtch.	bk. Helena	T. T. Verb
Am.	bk. Henry Warner	J. F. Palm
Nor.	bk. Hermon	O. Olsen.
Am.	bg. Jane Adeline	G. W. Cate
	bk. James S. Stone	C. F. Barn
	schr. John J. Hanson	L. J. Steve
	bkt. Josephine	Chas. Brow
	bk. John R. Stanhope	J. B. Nort
Am.	schr. Kennett	J. A. Smith
	bkt. Levanter	Geo. T. Ger
Am.	Light-ship No. 37	Andrew Jac
	bg. Lilian	H. F. Schi
	bk. Lillie Baker	J. W. Carr
	bg. L. F. Munson	J. V. McK
	bg. L. Staples	J. P. Stow
	bg. Lucy W. Stone	P. F. Berg
	schr. Messenger	N. H. Fall
	bk. Sarah	L. R. Hal
	schr. St. Croix	E. C. Rose
Aust.	bk. Vitez	
Am.	schr. Wm. F. Green	W. E. Cro
	bkt. Yose E. More	A. Loenha
	United States Naval.	
U. S. S.	Atlanta	F. M. Bun
U. S. C. S.	A. D. Bache	J. F. Mose
U. S. R. S.	Dale	Yates Stirl
U. S. S.	Despatch	W. S. Cow
U. S. R. S.	Franklin	G. C. Wilt
U. S. S.	Galena	C. M. Ches
U. S. C. S.	Gedney	F. H. Cros
U. S. R. S.	Independence	J. W. Phil
U. S. S.	Jamestown	C. J. Train
U. S. S.	Michigan	H. F. Pick
U. S. S.	Minnesota	Theo. F. K
U. S. S.	New Hampshire	F. J. Higg
U. S. S.	Omaha	
U. S. S.	Ossipee	W. B. Hoff
U. S. S.	Quinnebang	W. M. Fol
U. S. S.	Richmond	Robert Bag
U. S. S.	Saratoga	C. H. Dav
U. S. R. S.	St. Louis	Wm. Whit
U. S. S.	Yantic	O. F. Heye

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVI. WASHINGTON CITY, MARCH, 1888. No. 3.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for March, 1888, and is based upon the reports of regular and voluntary observers of both countries. Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appear the distribution of icebergs and field-ice and the limits of fog-belts west of the fortieth meridian. In the vicinity of Newfoundland the aggregate quantity of ocean ice reported was largely deficient, when compared with the average for March.

The month was colder than the average in nearly all districts, the temperature departures ranging from 4° to 10° over a large part of the country. In northern New England, however, the mean temperatures were considerably above the average.

The rainfall was generally in excess of the average, although there are several areas in which it was deficient.

The severe storm of March 11–14th forms the most important feature of the month, a full report of which, with special charts showing the attending atmospheric conditions, is given herein.

In the preparation of this REVIEW the following data, received up to April 20, 1888, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 23 Canadian stations, as telegraphed to this office; 180 monthly journals and 176 monthly means from the former and 23 monthly means from the latter; 315 monthly registers from voluntary observers; 60 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean pressure for March 1888, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure is greatest in the extreme northwest and over the region extending thence southeastward to the south Atlantic and east Gulf states, being 30.2, or slightly more, in the first-named districts, about 30.12 in the lower lake region, Ohio and central Mississippi valleys, and 30.15 in portions of Tennessee, Georgia, Florida, and the Carolinas. Eastward of this area of high mean pressure the barometric means fall to 29.95, or below, in northern New England and the Canadian Maritime Provinces; to the westward of the high area the mean pressure does not fall below 30.0, except over the southern Rocky Mountain districts, where a considerable area is inclosed by the isobar of 29.95. The extreme barometric means for the month are: highest, Fort Garry, Manitoba, 30.23; lowest, Sydney, N. S., 29.88; range, .35.

The departures from the normal pressure at the various Signal Service stations are given in the table of miscellaneous meteorological data. In the Rocky Mountain and Pacific coast districts the mean pressure is slightly below the normal, the deficiency not exceeding .06 at any station, and being less than .05, except over portions of the plateau districts and central California. Eastward of the Rocky Mountains the mean pressure is above the normal in all districts, the greatest departures occurring in the Lake region, where they range from .08 to .12; in New England, the Gulf States, and lower Missouri valley the mean pressure generally ranges from .02 to .05 above the normal.

Comparison of the mean pressure of March with that of the preceding month shows an increase in all districts, with the exception of the plateau and Pacific coast regions, and on the Atlantic coast northward of Virginia. The deficiency exceeds .10 in the middle and northern plateau districts, on the north Pacific coast, and in the Maritime Provinces of Canada; the excess ranges from .05 to .14 in northern districts from Montana eastward to the lower lakes, and from .01 to .05 in the central valleys and Southern States.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. The ranges, as usual, conform to the general rule, that is, they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In the states bordering on the Atlantic the extreme ranges are .38 at Key West, Fla., and 1.67 at Nantucket, Mass.; between the eighty-fifth and one hundredth meridians, .71 at Pensacola, Fla., and 1.47 at Saint Vincent, Minn.; eastern slope of the Rocky Mountains, .93 at Fort Davis, Tex., and 1.51 at Las Animas, Colo.; plateau region, .54 at Yuma, Ariz., and 1.04 at Salt Lake City, Utah; Pacific coast, .52 at San Diego, Cal., and .92 at Fort Canby, Wash. Compared with the normal barometric ranges for March, no very marked departures occur, except over the middle and southern Rocky Mountain slopes, where the ranges at some stations exceed the normal by more than half an inch.

AREAS OF HIGH PRESSURE.

Six well-defined areas of high pressure were observed during the month of March, 1888, within the limits of territory covered by the tri-daily weather charts. Of this number, one apparently approached the north Pacific coast from the west and crossed the continent, moving eastward to the Lake region, then southward to the Atlantic. Four were first observed in

the territory to the north of Montana and Dakota, and one to the north of Lake Superior. The general direction of movement was first to the southeast and afterward to the northeast.

The following table shows the latitude and longitude in which each area was first and last observed, the highest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Highest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	49 00	97 00	47 00	64 30	30.92	25.9
II	50 00	99 00	33 30	96 00	30.71	33.3
II *a*	50 30	94 30	31 00	83 00	30.70	16.6
III	47 30	123 00	38 00	74 30	30.52	26.1
IV	50 20	106 30	31 20	81 00	30.72	41.1
V	49 00	86 00	47 00	64 30	30.62	18.8
VI	50 20	107 30	35 00	76 00	30.52	31.2

Average rate of progress, 27.6 miles per hour.

I.—On the morning of March 1st the southern portion of this area is shown to occupy all of the United States between the Rocky and Appalachian Mountains. The centre of the area was located in the territory to the north of Dakota, where it remained without any apparent change of position, from February 29th to March 5th. The pressure at the most northerly stations increased until the morning of the 3d, reaching a height of 30.9, afterward it slowly decreased to 30.2 on the afternoon of the 6th, and the area moved to the southward until central over Arkansas, then to the eastward and finally to the northeast, disappearing off the coast of New Brunswick on the 10th, the central pressure having increased to 30.5. Light rains and snow were frequent within this area of high pressure until after the 5th, when they were of rare occurrence. A cold wave visited portions of the middle and southern slopes of the Rocky Mountains and the Missouri Valley on the 2d, the western Gulf states and the Ohio Valley on the 3d, and the middle Atlantic states on the 4th. The minimum temperatures of the month occurred from the 1st to the 6th over the northern slope of the Rocky Mountains, the Missouri Valley, Kansas, northern Colorado, Arizona, New Mexico, and Indian Territory; the temperature recorded at Helena and Fort Assinaboine, Mont., Fort Buford and Yankton, Dak., being lower than ever observed at those stations during any previous March.

II and II *a*.—At 10 p. m. of the 8th this area of high pressure was observed to the north of Montana. The area continued to extend to the southeast, and its centre appeared in north Dakota on the morning of the 10th, the pressure at the centre being near 30.5. During the 10th the movement was to the south, and on the 11th the area became very much elongated in a north and south direction and began to divide into two portions, one of which was central over the Indian Territory and the other over northern Minnesota. During the morning and afternoon of the 12th the two centres remained connected by a long narrow area, in which the pressure was but slightly lower than at the centres, but the 10 p. m. chart showed the division to be complete. The southern portion disappeared by a gradual decrease of pressure, while the northern portion assumed a position over Lake Superior, where it remained with pressure near 30.6 until the morning of the 14th, after which it moved southward with decreasing pressure and disappeared off the Gulf coast on the 16th. Fair weather, with fresh winds, prevailed within the limits of the area. A severe cold wave, during which the fall in temperature amounted to 30° in twenty-four hours, visited the middle and southern slopes on the 10th, and the temperature was below freezing. On the morning of the 11th the cold wave reached the upper Mississippi valley, the upper lake region, the western portion of the Ohio Valley and Tennessee, Arkansas, Mississippi, Louisiana, and eastern Texas, the fall ranging from 20° to 30° in twenty-four hours, the temperature everywhere north of Louisiana being below freezing. The minimum temperatures of the month occurred on the 11th, 12th, and 13th at most stations in the west Gulf states, the lower lake region, New York, Pennsylvania; at Pensacola, Fla., on the 12th; and at Mobile, Ala., on the 13th. The temperature at Fort Smith, Ark., on the 11th, and at Norfork, Va., on the 14th, was lower than ever before recorded at those stations in March.

III.—This area of high pressure apparently moved eastward from the north Pacific coast, its centre remaining to the north of the region of observation. During the 15th it extended to the southward over the northern and middle slopes of the Rocky Mountains and the Missouri Valley, and moved eastward during the morning and afternoon of the 16th over the upper Mississippi valley, after which the movement of the centre was apparently to the northeast, then to the southeast, passing off the coast of the middle Atlantic states on the morning of the 19th. The pressure at the centre remained nearly constant, 30.4, until 10 p. m. of the 15th, after which it decreased to 30.2. Generally fair weather, with light winds, prevailed within the limits of the area, and it was accompanied by a fall of temperature over northern Dakota and Minnesota of 20° in twenty-four hours. The fall of temperature was less marked in other portions of the country over which the area passed.

IV.—This area of high pressure apparently moved southeastward from the north Pacific coast. The advance isobars appeared over Montana on the afternoon of the 20th; the area advanced rapidly southeastward, and at 10 p. m. of the 21st its centre, bounded by the isobar of 30.4, extended from Texas northward beyond the region of observation. At three stations, Fort Sill, Ind. T., Huron, Dak., and Q'Appelle, N. W. T., the pressure was 30.5. The area maintained the central pressure and, gradually growing more circular in form, passed off the coast of the south Atlantic states on the afternoon of the 23d. It was accompanied throughout its course by fair weather and light winds, excepting over the Lake region on the 22d, when light snows occurred and the wind attained maximum velocities of thirty-five miles, due to the influence of an area of low pressure then central over the New England States; also by a cold wave, which caused a fall of 30° in twenty-four hours on the 21st over eastern Montana, northern Dakota, and Minnesota, and, on the morning of the 23d, over northern Michigan, the temperature going below zero. The wave became somewhat less marked as it moved southeastward over the upper Mississippi valley, the Lake region, the Ohio Valley, and the middle Atlantic states. On the morning of the 23d freezing temperatures were experienced as far south as Montgomery, Ala., Atlanta and Savannah, Ga. The lowest temperature of the month occurred at nearly all stations in the upper Mississippi valley on the 22d; over the upper lake region, the Ohio Valley and Tennessee, the south Atlantic and east Gulf states on the 22d and 23d.

V.—This area of high pressure developed after the 7 a. m. observation of the 23d on the northern border of the area just described. Its centre was apparently located north of Lake Superior, where it remained until the afternoon of the 24th, the area having gradually extended to the coast of the middle Atlantic states. After this its movement was to the southeast until central on the coast of New Jersey, then to the northeast, the pressure increasing from 30.5, which had been maintained from the time of its formation, to 30.6, and it passed to the Gulf of Saint Lawrence after 3 p. m. of the 27th. Light snows occurred in the southern part of the area over the lower Lake region, the Ohio Valley, Pennsylvania, and New York during the 23d and 24th, probably caused by two areas of low pressure, one central over the lower Saint Lawrence valley and the other over Texas. Only slight changes of temperature occurred over the first portion of its course, and a fall of only 10° was noted over the New England States.

VI.—The morning chart of the 26th shows an area of high pressure central in Montana, and extending southward over the northern and middle slopes of the Rocky Mountains, the central pressure inclosed by the isobar of 30.5. The area moved to the southeast, the pressure at the centre steadily decreasing,

falling slightly below the normal while over the Ohio Valley on the 28th, after which it increased, being 30.3 when the area passed off the south Atlantic coast on the 30th. Light snow was of frequent occurrence within the eastern limits of the area, and it was accompanied by a slight fall of temperature over the northern and middle slopes of the Rocky Mountains, and the greatest fall occurred over a limited area embracing southwest Missouri and northwest Arkansas, which was about 20°, and reached the freezing point.

AREAS OF LOW PRESSURE.

Nine well-defined areas of low pressure have been traced during March, 1888, over the territory covered by tri-daily observations. These tracks (see chart number i) as a general thing conform to the usual direction of low areas. Two of the areas originated in the Gulf of Mexico, off the coast of Texas, and moved in a northeasterly direction; one, described below as number iv, developed over the south Atlantic states and moved in a northeasterly direction along the coast, displaying remarkable energy; one moved from the north Pacific coast to the southeast, changing direction to northeast when near the thirty-fifth parallel; the remaining five were first observed to the north of Montana, one moving eastward, the other four moving first to the southeast changed direction to the westward, then resumed the southeast movement till near the thirty-fifth parallel, when the direction again changed to the northeast.

The following table shows the latitude and longitude in which each area was first and last observed, the lowest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Lowest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	50 50	115 00	40 20	70 50	29.34	33.3
II	26 00	96 00	33 00	77 30	29.74	40.6
III	44 30	123 00	47 00	77 50	29.50	29.3
IV	34 20	82 20	40 00	71 00	28.92	16.6
V	52 00	106 30	47 00	65 00	29.06	35.8
VI	52 00	114 00	47 45	87 00	29.42	41.9
VII	51 00	114 00	47 00	84 00	29.36	34.0
VIII	27 00	94 30	49 45	63 00	29.28	33.3
IX	52 30	113 00	47 30	59 00	29.54	45.6

Average rate of progress, 34.5 miles per hour.

The following is a brief description of each area, with the marked weather conditions prevailing during each:

I.—On the 10 p. m. chart of February 26th, the advance isobar of this area of low pressure appeared over western Montana and Washington Territory. The area moved eastward, at the same time extending rapidly southward, until between the one hundred and second and one hundred and seventh meridians, when its path changed to the southwest. It was central near Salt Lake City, Utah, on the morning of the 28th, and moved slowly and irregularly to the southward until near the thirty-fifth parallel, when its course was changed to the northeast. From the upper lake region it moved to the east, and passed off the coast of the New England States on the morning of March 3d. The pressure at the center fell to 29.34 at 3 p. m. of the 27th, but increased to 29.5 at the succeeding observation, remaining steady until the storm started to the northeast, when the pressure increased to 29.9. It was accompanied by fair weather on the 27th and 28th, and on the 29th light snow occurred over the northern slope of the Rocky Mountains. On the morning of the 1st rains were general over the lower Missouri valley, the upper Mississippi valley, the Ohio Valley, and the Lake region, except in Minnesota, northern Wisconsin, and northern Michigan, where snow fell. Rain and snow continued during the 2d over the upper Mississippi valley, the Ohio Valley, and the Lake region, and began over the middle Atlantic and New England States. During the 3d snow continued over the lower lake region, New York, and New England. On February 27th a remarkable rise in temperature of from 20° to 40° in twenty-four hours occurred over the northern and middle slopes of the Rocky Mountains. At Valentine, Nebr., at 3 p. m., the rise in temperature amounted to 52° in eight hours. The warm wave moved to the southeast during the 28th and 29th, causing a rise in temperature of from 20° to 30° over the central valleys. The temperature over the Lake region changed but slightly during the passage of the storm. The winds were generally light, excepting over the Lakes and on the New England coast on the 2d and 3d, where they reached velocities of from thirty to forty-five miles.

II.—On the morning chart of the 4th an area of low pressure was apparently central off the coast of Texas. It moved in a northeasterly direction and passed to the ocean from the coast of the south Atlantic states at 3 p. m. of the 5th. The pressure at the centre remained near 29.9, but decreased as the area approached the coast, the lowest pressure observed being 29.74. The heavy rains which occurred in eastern Texas and Louisiana on the afternoon and night of the 3d were probably caused by the approach from the Gulf of this area of low pressure. The following heavy rainfalls were reported: 3d, 3 p. m., Palestine, Tex., 3.04; 3d, 10 p. m., Palestine, Tex., 1.46; Shreveport, La., 1.42; 4th, 7 a. m., Vicksburg, Miss., 1.50; 4th, 3 p. m., Palestine, 1.02; the total rainfall for the storm being for Palestine, 6.52; for Shreveport, 3.88, and for Vicksburg, 3.44. It was attended by light winds and no change in temperature.

III.—This storm was central on the afternoon of the 7th over southwestern Idaho, and covered all of the United States to the west of the Rocky Mountains. It moved to the southeast, maintaining a pressure of 29.6 until near the thirty-fifth parallel, when the direction of movement changed to the northeast, and the pressure at the centre increased to 29.8. The 7 a. m. chart of March 11th shows a secondary depression (hereafter described as number iv) to have developed within the southern part of this area of low pressure. It disappeared to the northward after the 3 p. m. observation of the 11th. It was accompanied by rains over the Pacific slope and southern plateau on the 8th, by very light local snows over the middle and southern slopes of the Rocky Mountains on the 9th, and by general rain over the upper Mississippi valley, the Ohio Valley, and the Lake region on the 10th and 11th, except at the most northerly stations of the Lake district, where snow fell. The winds within the area were generally light, excepting over the Lake region on the night of the 10th and 11th, when velocities of from twenty-five to thirty-five miles were attained. A slight rise in temperature attended the movement of the area eastward, the greatest rise occurring over Kansas and Nebraska on the morning of the 8th, when it amounted to 30° in twenty-four hours. The increase of temperature over the central valleys was generally not more than 10°, but at northern stations in the upper lake region amounted to 20° in twenty-four hours.

IV.—The most severe storm of the month, and the most violent that has occurred in the eastern portion of the United States for a number of years, was first observed as a feeble cyclonic disturbance central in northern Georgia on the morning of the 11th, although the barometric disturbance within which this storm developed had its origin in the north Pacific, where it was observed on the 6th. The 7 a. m. report of the 10th exhibited an extended barometric trough, covering the central valleys, within which heavy rains were reported from the Gulf coast northward to Lake Superior, while areas of high pressure covered the Atlantic coast and the northern Rocky Mountain regions. This barometric trough moved slowly eastward during the 10th, causing unusually heavy rains in the Southern States, and rain, followed by snow, in the Lake region and Ohio Valley. The anti-cyclone which followed quickly the passage of this barometric trough over the central valleys was attended by a cold wave, causing marked and sudden changes in temperature within a few hours after the wind shifted to northwest. These contrasts of temperature are indicated by reports on the afternoon of the 10th, as follows: Cairo, Ill., 50°; Springfield, Mo., 24°; Memphis, Tenn., 64°; Fort Gibson, Ind. T., 32°; Chicago, Ill., 44°; Keokuk, Iowa, 22°. These thermal conditions existed when the barometric trough extended from

Louisiana northward to Lake Superior, the barometer being lowest over Lake Michigan, where the primary storm was at that time central. During the 11th the northern cyclonic disturbance moved northeastward and disappeared beyond the limits of the stations of observation, while the secondary disturbance moved eastward towards Cape Hatteras, N. C., and thence northeastward along the middle Atlantic coast, as indicated by the accompanying charts. As the centre approached the coast it developed great energy, causing destructive gales, which were attended by heavy rains southward of Virginia, and rain, turning to snow, from Virginia northward over the middle Atlantic states and New England. The accompanying table shows for stations east of the Mississippi the minimum barometer reported during this storm, the amount of precipitation for each day from the 11th to 14th, the direction and maximum velocity of wind, together with the total movement for the month and for the four days of the storm:

Stations.	Min. bar.		Rainfall.					Maximum wind velocity, and direction.								Movement of 4 days, 11–14th.	Movement for March.	Per cent.
								11th.		12th.		13th.		14th.				
	Height.	Date.	11th.	12th.	13th.	14th.	Total.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.			
																Miles.	*Miles.*	
Eastport	29.51	13	0.00	0.00	0.21	0.14	0.35	e.	16	e.	56	e.	72	e.	40	2,529	9,724	26
Portland	29.32	13	T.	0.47	0.22	T.	0.69	se.	19	ne.	36	ne.	42	n.	23	1,588	6,764	23
Boston	29.09	12	0.00	0.72	0.30	0.32	1.24	ne.	25	n.	54	e.	60	n.	34	2,212	11,433	19
Nantucket	28.93	12	0.00	0.55	0.08	0.05	0.68	se.	26	se.	54	s.	34	ne.	26	1,713	9,601	18
Block Island	28.92	13	0.02	0.88	0.08	0.02	1.00	e.	44	e.	70	n.	50	ne.	38	2,992	15,044	20
New London	29.05	13	0.03	1.88	0.22	0.04	2.17	se.	36	n.	46	n.	36	n.	18	1,474	7,253	20
New Haven	29.23	13	0.97	2.80	1.53	0.10	4.50	se.	26	n.	48	n.	45	n.	26	1,884	8,070	23
Wood's Holl	28.92	12	T.	1.17	T.	0.10	1.27	se.	20	ne.	36	se.	30	ne.	24	1,757	13,947	13
Northfield	29.54	13	0.09	1.46	0.67	0.00	2.22	s.	26	n.	40	n.	39	n.	26	1,582	8,573	18
Manchester	29.22	13	0.01	1.20	0.50	0.34	2.05	se.	14	ne.	28	ne.	28	ne.	20	1,063	6,838	16
Albany	29.53	13	0.28	2.29	0.93	0.13	3.63	s.	24	nw.	26	nw.	30	n.	24	1,341	6,716	20
New York City	29.40	13	0.40	1.58	0.35	0.13	2.46	ne.	21	w.	48	w.	50	nw.	24	2,189	10,470	21
Atlantic City	29.57	13	0.55	0.66	T.	0.02	1.23	e.	23	nw.	60	nw.	48	nw.	30	2,526	9,873	26
Philadelphia	29.61	13	1.25	1.27	T.	0.02	2.54	n.	24	nw.	60	nw.	56	nw.	37	2,552	10,586	24
Baltimore	29.71	13	1.58	0.06	T.	T.	1.64	nw.	24	nw.	33	nw.	32	nw.	24	1,474	5,495	27
Washington	29.75	13	1.65	T.	T.	T.	1.65	nw.	30	nw.	36	nw.	42	nw.	26	1,837	6,152	30
Norfolk	29.92	13	0.97	0.00	0.00	T.	0.97	nw.	55	nw.	54	w.	46	w.	29	2,201	7,929	28
Lynchburg	29.80	13	1.69	0.00	0.00	0.00	1.69	nw.	24	nw.	26	nw.	24	nw.	29	1,189	3,907	30
Hatteras	29.76	13	1.78	0.00	0.00	0.00	1.78	nw.	55	nw.	60	w.	37	nw.	42	2,292	12,352	19
Wilmington	29.69	11	1.45	0.00	0.00	0.00	1.45	s.	24	nw.	19	nw.	24	nw.	24	1,168	6,587	18
Charlotte	29.87	13	0.97	0.00	0.00	0.00	0.97	nw.	30	nw.	24	nw.	30	ne.	24	.....	.....	..
Atlanta	29.90	11	0.24	0.00	0.00	0.00	0.24	n.	35	n.	30	nw.	28	nw.	20	.....	.....	..
Augusta	29.84	11	0.30	T.	0.00	T.	0.30	nw.	22	w.	10	w.	18	nw.	15	.....	.....	..
Charleston	29.78	11	0.70	0.00	0.00	0.00	0.70	s.	27	nw.	24	nw.	24	nw.	23	.....	.....	..
Savannah*	29.83	11	0.08	0.00	0.00	0.00	0.08	nw.	34	nw.	35	nw.	24	nw.	20	.....	.....	..
Jacksonville	29.85	11	0.42	0.00	0.00	0.00	0.42	nw.	26	nw.	24	w.	22	nw.	18	.....	.....	..
Raleigh	29.78	11	1.31	0.00	.000	0.00	1.31	nw.	30	nw.	24	nw.	30	nw.	24	.....	.....	..
Cedar Keys	29.91	11	0.26	0.00	0.00	0.00	0.26	nw.	30	nw.	29	nw.	19	w.	20	.....	.....	..
Key West	29.94	11	0.62	0.02	0.00	0.00	0.64	ne.	27	n.	35	n.	22	n.	21	.....	.....	..
Titusville	29.88	11	1.25	0.00	0.00	0.00	1.25	w.	28	n.	30	nw.	10	nw.	20	.....	.....	..
Point Jupiter	29.88	11	0.64	0.00	0.00	0.00	0.64	s.	26	n.	30	nw.	10	nw.	20	.....	.....	..
Montgomery*	29.98	11	0.31	0.00	0.00	0.00	0.31	se.	23	n.	26	nw.	18	nw.	18	.....	.....	..
Pensacola†	29.99	11	0.06	0.00	0.00	0.00	0.06	nw.	30	n.	16	w.	14	nw.	12	.....	.....	..
Mobile	30.09	11	0.00	0.00	0.00	0.00	0.00	n.	30	n.	24	sw.	24	n.	14	.....	.....	..
Vicksburg	30.17	13	0.00	0.00	0.00	0.00	0.00	n.	36	n.	26	s.	18	n.	15	.....	.....	..
New Orleans	30.12	11	0.02	0.00	0.00	0.00	0.02	n.	33	w.	11	w.	15	e.	14	.....	.....	..
Nashville	30.15	13	0.46	T.	0.00	T.	0.46	nw.	32	n.	24	nw.	11	w.	10	.....	.....	..
Memphis	30.12	13	0.01	0.00	0.00	0.00	0.01	nw.	27	nw.	15	nw.	12	n.	15	.....	.....	..
Chattanooga	30.11	13	0.39	T.	T.	T.	0.39	nw.	36	w.	12	nw.	15	ne.	12	.....	.....	..
Knoxville	29.99	11	0.73	T.	T.	T.	0.73	n.	42	nw.	23	nw.	18	n.	15	.....	.....	..
Pittsburg	29.86	11	0.55	0.02	0.02	0.03	0.62	n.	24	nw.	13	nw.	16	n.	12	.....	.....	..
Columbus	29.96	11	0.34	0.00	T.	0.00	0.34	s.	25	nw.	18	nw.	30	nw.	13	.....	.....	..
Indianapolis	30.18	11	0.00	0.00	0.00	T.	0.00	w.	28	w.	24	nw.	24	n.	22	.....	.....	..
Cincinnati	30.09	11	0.17	0.00	0.00	0.00	0.17	nw.	25	w.	18	n.	16	n.	18	.....	.....	..
Louisville	30.19	11	0.22	0.00	0.00	0.00	0.28	nw.	25	ne.	24	n.	25	n.	19	.....	.....	..
Lexington	.....	..	0.62	0.00	0.00	0.00	0.62	nw.	32	w.	23	n.	16	n.	22	.....	.....	..
Cairo	30.17	13	0.00	0.00	0.00	0.00	0.00	nw.	26	w.	18	n.	17	n.	15	.....	.....	..
Detroit	29.84	11	0.18	0.00	T.	T.	0.18	w.	24	w.	11	nw.	23	n.	20	.....	.....	..
Toledo	29.96	11	0.13	0.00	0.00	0.00	0.13	nw.	28	nw.	24	n.	26	nw. n.	26	.....	.....	..
Sandusky	29.94	11	0.17	0.00	T.	T.	0.17	nw.	36	nw.	28	nw.	32	nw.	26	.....	.....	..
Cleveland	29.87	11	0.18	T.	0.24	0.04	0.46	n.	43	nw.	41	nw.	37	n.	36	.....	.....	..
Erie	29.90	11	0.35	0.03	0.08	0.01	0.47	s.	30	n.	29	nw.	27	n.	20	.....	.....	..
Buffalo	29.83	11	0.29	0.01	0.07	0.06	0.43	s.	32	nw.	20	n.	26	w.	15	.....	.....	..
Rochester	29.90	13	0.16	0.02	0.54	0.20	0.92	sw.	40	nw.	26	nw.	28	nw.	20	.....	.....	..
Oswego	29.84	13	0.14	T.	0.04	T.	0.18	s.	32	nw.	34	nw.	33	nw.	20	.....	.....	..
Duluth	30.25	14	0.00	0.00	0.00	0.00	0.00	w.	30	n.	33	n.	39	n.	24	.....	.....	..
Marquette	30.14	11	T.	0.00	T.	0.00	T.	nw.	15	ne.	22	ne.	14	ne.	9	.....	.....	..
Milwaukee	30.23	11	0.06	0.00	0.00	0.00	0.06	nw.	34	nw.	20	nw.	9	nw.	10	.....	.....	..
Chicago	30.25	11	0.03	0.00	0.00	0.00	0.03	nw.	36	ne.	15	n.	24	n.	15	.....	.....	..
Grand Haven	30.04	11	0.04	0.00	0.00	0.00	0.04	nw.	24	nw. n.	17	ne.	18	ne.	17	.....	.....	..
Mackinaw City	29.98	11	0.05	T.	T.	0.00	0.05	w.	37	n.	21	n.	21	n.	15	.....	.....	..
Alpena	29.87	11	0.06	0.00	T.	T.	0.06	w.	34	w.	20	nw.	17	nw.	10	.....	.....	..
Port Huron	29.85	11	0.37	0.00	0.01	0.02	0.40	nw.	36	w.	21	w.	28	nw.	24	.....	.....	..
Lansing	30.03	11	0.11	0.00	0.00	0.00	0.11	nw.	36	nw.	34	n.	37	nw.	36	.....	.....	..
Green Bay	30.23	11	0.05	0.00	0.00	0.00	0.05	w. nw.	34	w. nw.	17	n.	20	n.	16	.....	.....	..
								w. nw.	24	n.	12	n.	12	n.	7	.....	.....	..

NOTE.—At Sandy Hook, N. J., the estimated velocity of wind was 90 miles per hour.
*1.09 inches of rain fell on the 10th. †4.05 inches of rain fell on the 10th.

The accompanying charts exhibit the barometric conditions existing at each of the tri-daily reports during the prevalence of the storm. With the addition of marine reports the centre of this storm has been traced from eastern North Carolina northward to eastern Massachusetts, where it apparently attained its maximum energy. The succeeding reports show that after the morning of the 13th there was an extension of the low area to the eastward.

When this disturbance reached the Atlantic coast, on the afternoon of the 11th, two well-defined barometric depressions were observed, one central near Wilmington, N. C., and the other central to the north of Lake Ontario, the minimum barometer observed in each being respectively 29.68 and 29.70. These disturbances were followed by an area of high pressure which extended from the Gulf coast to British America, causing cold northerly winds from the Mississippi and Ohio valleys to the Lake region. During the night of the 13th the storm-centre passed to the east of the coast line, near Hatteras, N. C., attended by the most severe gales that have occurred during recent years on the North Carolina coast. The wind remained southeasterly at Hatteras and Kitty Hawk, N. C., until about 8 p. m., when it shifted to the northwest, with increasing force. After the centre passed over the Atlantic it apparently moved northward, becoming very contracted, and the bounding isobars changing from an elliptical to a circular form as it approached the New England coast. The heavy snows and high winds attending this disturbance caused interruption to telegraphic communication throughout the middle Atlantic and New England states, the Signal Service being unable to receive its regular tri-daily reports from the 11th until the 15th. Railway communication was generally interrupted during the 12th, 13th, and 14th, in New York, New England, and eastern Pennsylvania. After the centre reached eastern Massachusetts the barometer rose rapidly to the westward, while the marine reports indicate that the disturbance extended eastward over the Atlantic. A secondary disturbance, however, formed on the southern New England coast, and remained almost stationary during the 13th, thus accounting for the persistence of the storm and the brisk and high southeasterly winds in the east portion of Long Island, while strong westerly winds continued on the New York and New Jersey coasts. This secondary disturbance apparently passed eastward on the 14th and united with the ocean storm, near N. 42°, W. 60°, on the morning of the 15th, after which the general direction of movement was to the northeastward over the north Atlantic, attended by continuous gales until the 19th, when it was last observed in N. 56°, W. 27°.

Table showing maximum barometric gradient occurring during the storm.

Station.	Barometer.	Range.	Distance.	Gradient.
Block Island	28.92	.....	.....	.....
New London	29.05	0.13 inch.	32 miles	6.3 or 0.41 inch to 100 miles.
New Haven	29.23	0.51 inch.	71 miles	6.6 or 0.44 inch to 100 miles.
New York	29.44	0.52 inch.	129 miles	6.3 or 0.41 inch to 100 miles.
Albany	29.58	0.66 inch.	154 miles	6.5 or 0.43 inch to 100 miles.
Erie	30.20	1.28 inch.	446 miles	4.4 or 0.29 inch to 100 miles.

The following notes, made by Signal Service observers, serve to illustrate the extent and severity of this storm:

Hatteras, N. C., 11th: light rain during morning and very heavy rain, with high wind, in the afternoon; 1.40 inches of rain fell between 4 and 5.20 p. m., and a wind velocity of sixty miles occurred at 10.30 p. m.; very high tide, nearly submerging the island.

Chicamicomico, N. C., 11th: light southeasterly winds in morning, increasing to gale at 5 p. m.; calmed at 8 p. m., and afterwards backed to northwest and increased to strong gale, which continued throughout the 12th.

Norfolk, Va., 11th: at 6.45 p. m. the wind shifted to northwest and a furious gale set in from that quarter and continued without abatement throughout the 12th, the wind reaching a maximum velocity of sixty miles per hour. This storm was one of the most violent that has occurred here since the memorable storm of 1879. Many vessels at anchor in this harbor were blown ashore and wrecked; at Hampton Roads a sloop was capsized and all on board perished.

Cape Henry, Va., 11th: southeast wind prevailed until 7.15 p. m., when it suddenly shifted to northwest and blew with great violence; the storm continued during the 12th with unabated force.

Baltimore, Md., 11th: light rain fell at intervals until noon, then heavy rain

until 6.50 p. m., when it changed to snow, accompanied by high northwest wind; in a short time telegraphic communication was cut off with nearly all points. The snow storm ended during the night of the 11–12th and was followed by cold weather, the wind continuing from northwest throughout the 12th (the maximum velocity being thirty-three miles per hour) causing the lowest tide for many years, the bottom of the harbor being exposed in many places. This severe storm caused an almost entire suspension of business on the 12th. Reports from the surrounding country and from Chesapeake Bay show the storm to have been very severe, and many vessels arriving on the 14th and 15th reported having experienced remarkably rough weather. The tide in Baltimore harbor did not resume its normal height until the 16th.

Atlantic City, N. J., 11th: rapidly falling barometer and brisk east wind in the afternoon; rain began at 3.10 p. m., and during the night of the 11-12th turned to snow, the wind changing to northwest, and at 1 a. m. increased to a gale which continued until the morning of the 14th. The sloops "Neptune" and "Alert" were blown from their anchorage and sunk. The heavy snow caused delay of trains.

Philadelphia, Pa., 11th: light rain began at 8.45 a. m., and during the evening changed to heavy rain; wind, northeast; barometer falling rapidly; at 11.15 p. m. the heavy rain changed to snow; wind, north. The storm continued with great severity during the night of the 11-12th, the fierce north wind, blinding snow, and rapidly falling temperature causing suspension of street railway traffic. Throughout the day the wind velocity ranged from thirty to sixty miles per hour, the maximum occurring at 10.30 a. m. The most enterprising street railway companies were unable to resume traffic until noon of the 13th. At the Breakwater, out of forty vessels in the harbor on the 11th, only thirteen escaped damage or destruction, and thirty or more lives were lost. The damage sustained by the Breakwater and to marine interests is estimated at half a million dollars, but, vast as is this sum, it becomes inconsiderable when compared with the losses sustained by the several railroad companies, the least part of which, although great, being the prolonged interruption to travel. This storm is considered the most disastrous that has ever visited this locality.

New York City, 11th: cloudy in the morning; light rain in afternoon and evening; at 12.10 a. m. on the 12th rain changed to snow which continued throughout the day, accompanied by high northwest winds, reaching a velocity of forty-eight miles per hour. Travel by street railway was entirely suspended by 7 a. m., and at some points the snow drifts were from fifteen to twenty feet deep. On the 13th light snow fell in the early morning and at intervals during the afternoon and evening, accompanied by high westerly winds. This storm is generally considered the severest ever experienced here.

Albany, N. Y., 11th: rapidly falling barometer with brisk south wind backing to westerly, and flurries of snow during the day. Heavy snow fell during the night of the 11-12th, and drifted so as to render travelling difficult. At 7 p. m. snow drifts were from three to four feet deep, and after 10 p. m. it was dangerous for persons to venture out of doors. The storm continued on the 13th, but with less violence, and ended on the morning of the 14th. Nearly forty-seven inches of snow fell during the storm.

Oswego, N. Y., 11th: rain, snow, and sleet prevailed at intervals until 3.40 p. m., when steady snow set in and continued at intervals until the night of the 13-14th, the wind reaching a maximum velocity of thirty-nine miles per hour at 10 p. m. on the 13th. The snow was badly drifted by high winds, resulting in delay of railway trains.

New Haven, Conn., 11th: barometer fell steadily all day; snow began at 3.30 p. m., changing to rain at 7.45, and to sleet before midnight; during the night sleet changed to snow, which fell heavily throughout the 12th, accompanied by high north wind, maintaining a velocity of about thirty-six miles per hour all day and occasionally blowing in gusts of sixty miles per hour. At Light-House Point the wind-velocity was estimated at seventy miles per hour. Telegraphic communication with New York City was cut off and travel of all kinds interrupted. The storm continued until the morning of the 13th, on which date the streets of New Haven were utterly impassable and business was suspended. The storm caused much suffering and the police rescued many exhausted persons from snow-drifts in the heart of the city. The first train since the 12th arrived on the afternoon of the 14th. The total depth of snow during the storm was forty-four inches.

New London, Conn., 12th: rain and sleet fell in the afternoon, changing to snow at 4 p. m., accompanied by furious gale, making travel almost impossible and very dangerous. All railroads to the west were blockaded in the morning and in the afternoon those to the east were also blockaded and telegraph lines were prostrated. The barometer fell rapidly during the day, and at night read 29.10. Snow continued until 11.20 p. m. on the 13th, when some drifts were from eight to ten feet deep. Trains from the east arrived, and the New York steamers resumed their regular trips on the 14th.

Block Island, R. I., 11th: cloudy nearly all day, with light rain from 8 to 9.45 p. m.; southeast winds until evening, when a heavy gale set in, maximum velocity, forty-four miles; falling barometer. 12th, light rain began during the night and fell steadily until 5.45 p. m., when it changed to snow and sleet; at the same time the wind shifted from east to north, without decreasing much in force, a terrific gale having blown all day, with a maximum velocity of seventy miles east; the barometer (reduced) at 10 p. m. read 28.99. The storm continued until the afternoon of the 13th, the wind subsiding about noon and the snow ending at 4 p. m.

Boston, Mass., 12th: at the morning observation the barometer showed a decided fall, and it continued to fall rapidly during the day, ranging from 29.83 at 7 p. m. to 29.09 at 10 p. m. The wind was north or northeast, blowing in heavy gales, reaching a maximum velocity of fifty-four miles north between 4 and 5 p. m. Light rain began about 6 a. m. and turned to snow at 7.15 and lasted all day. 13th, the barometer showed a slight rise at 7 a. m. and continued to rise all day, with strong northeast and east gales, reaching a velocity of sixty miles. All railroads were blockaded and telegraph communication was cut off. 14th, wind backed from northeast to northwest, moderate in force; maximum velocity thirty-four miles; trains still unable to move; many vessels left port in the afternoon. Reports show that the storm was of unusual severity at points south and west of here.

Portland, Me., 12th: brisk to high east shifting to northeast winds, with light to heavy snow; maximum wind velocity, forty-two miles northeast, at 10 p. m.; this was one of the severest storms of the winter at this place and rendered travelling difficult. Telegraph lines were prostrated and railroads blocked. High southeast and east winds continued on the 13th.

Eastport, Me., 12th; rapidly falling barometer; gale began at 9.05 a. m. and continued until early a. m of the 14th, reaching its maximum velocity, seventy-two miles east, at 6.18 a. m. on the 13th. This was the most severe storm that has occurred here since April, 1873.

The following interesting report concerning this storm has been furnished by Professor Upton:

PROVIDENCE, R. I., *April* 20, 1888.

The CHIEF SIGNAL OFFICER,
Washington, D. C.

DEAR SIR: I have the honor to communicate to you the following summary of my study of the storm of March 11–14th, in advance of its publication, that you may make whatever use you wish of it in the preparation of the MONTHLY WEATHER REVIEW:

1. *Path of the storm.*—By charting the barometric and wind reports from New England and from vessels off the coast, I find that the centre was near Martha's Vineyard, March 12th, 10 p. m., then moved northwestward, and that the cyclone ceased to have a definite existence on the 14th over Connecticut. This path I ascribe to the main centre itself rather than to an offshoot, as I can find no indication of the continued advance of the storm-centre, except as above, from the ship reports at hand, kindly transmitted to me by the U. S. Hydrographic Office. It is probable, however, that a second centre formed off the coast on the 14th, as the barometric indications in the afternoon of that day point to a low area in the ocean. I beg leave to inclose maps showing the isobars drawn for the important times illustrating the above paths.

2. *Cold wave.*—The above deflection was due to the simultaneous arrival in New England of a cold wave, which also ceased to maintain its independent existence over Connecticut. I add isotherms to the above maps, which illustrate this fact. From the deadly encounter of the cyclone and cold wave neither combatant recovered.

3. *Precipitation.*—This was exclusively snow in the western area, where the cold wave advanced, rain and snow in the eastern area. I have collected four hundred and twenty reports of the estimated depth of snow, from which the inclosed map is constructed. While the estimates of snow, so badly drifted (many drifts were twenty to forty feet high by actual measurement), are necessarily rough, I find a good agreement in neighboring estimates, some of which were made in the woods, and others confirmed by the large amount of water obtained by melting. I place, therefore, considerable confidence in the lines drawn, as showing, approximately, the distribution of the snow. Two maximum areas, in which the average depths of snow exceeded forty inches, are drawn. From the returns of rain and melted snow, I add to the map dotted lines showing the distribution of the total precipitation in the region east of the maximum snow area. I have not attempted to draw these lines in the region where the snow was heavy and badly drifted. The maximum reports of total precipitation are: Albany, 3.63 inches; New Haven, 4.50 inches; Wallingford, 5.47 inches; Middletown, 5.78 inches; and, also, for this region Setauket, Long Island, 3.85 inches; Hartford, 2.69 inches. The map shows a minimum snow area near Hartford.

The explanation of the excessive precipitation is probably the great cooling of air already saturated. A cooling of 26° Fahrenheit would cause the precipitation to be doubled, and this is found to be the case by comparing the precipitation where most excessive with that in the eastern part of the district where the air was but little affected by the cold wave.

I beg to acknowledge the courtesy shown in ordering the observers of the Signal Service to send me special reports of the storm. Any of the data which the New England Meteorological Society has collected is at your service. An article giving the results of our investigation, of which the above is a summary, will be published in the American Meteorological Journal for May.

I have the honor to remain,
Yours, very respectfully,

WINSLOW UPTON,
Secretary New England Meteorological Society.

Chart number v, showing the amount of snowfall, has been prepared by Professor Upton, and is of especial interest.

Fig. 1 indicates the barometric conditions within this storm at 10 p. m. of the 12th, as shown by a plane passing through the axis of the storm in a northeasterly direction. This section extends from Lynchburg, Va., to Halifax, N. S., and the curve shows the barometric readings along the line at the hour stated above.

Fig. 2 indicates a similar section at 7 a. m. of the 13th, cut by a plane passing through the axis of the storm in an east and west direction. This sharp curve serves to show the unusually steep barometric gradient which existed between Block Island and New York when the storm reached its maximum energy.

Figs. 3 and 4 represent sections of storm at 3 p. m. and 10 p. m. of the 13th, cut by a plane similar to that described in Fig. 2, and serve to indicate the formation of the slight depression which existed to the westward of the centre of the principal disturbance, as indicated by the previous 7 a. m. report.

Figs. 5, 6, and 7 represent barograms constructed from observations taken at New York, Block Island, and Boston, respectively, during the 11th, 12th, 13th, and 14th.

V.—During the 16th a decline in pressure over the northwest indicated the approach of an area of low pressure, which was central over Dakota at 7 a. m. of the 18th, the central pressure inclosed by the isobar of 29.4. It moved in a direction west of south, and at 10 p. m. was central over Colorado, Las Animas reporting a pressure of 29.06, the lowest that occurred during the disturbance. A trough of low pressure extended northeast to Lake Superior. A marked rise in temperature, ranging from 20° to 30° in twenty-four hours, occurred over the Missouri Valley, the upper Mississippi valley, the Lake region, and the Ohio Valley during the 18th, and the first precipitation of the storm was reported at 10 p. m. of that date from a few stations in the northern and middle slopes of the Rocky Mountains.

During the 19th the storm moved northeast to Lake Superior, accompanied by a still further rise in temperature over the Lake region and the Ohio Valley; rain became general within the limits of the area, continuing during the remainder of its course, and the pressure increased at the centre to 29.4. At 10 p. m. of the 20th the centre was located to the north of Lake Ontario, a trough of low pressure extended southward to Tennessee, and the area described as number vi was central over Lake Superior. The following chart shows that the two areas had combined into one area nearly circular in shape, central over Lake Erie; Erie, Pa., reporting a pressure of 29.14. Severe gales prevailed over the Lake region on the 20th, 21st, and 22d. It moved with increasing pressure slowly and irregularly northeastward to the Gulf of Saint Lawrence, causing severe gales along the middle Atlantic and New England coasts on the 22d and 23d. The maximum temperatures of the month occurred slightly in advance of this storm at most stations in Montana on the 17th; at all stations in Dakota on the 16th, 17th, and 18th; over Minnesota, except at Duluth, on the 18th; over northern Wyoming; over Nebraska, except at North Platte on the 17th and 18th; over Kansas, except at Dodge City, on the 18th; over the Ohio Valley north of the Ohio River, except at Cincinnati; and over the Lake region on the 19th and 20th; also at Knoxville, Tenn., on the 20th, at Lynchburg, Va., on the 21st, and at several stations in New England, on the 21st and 22d.

VI.—This area of low pressure was first observed on the afternoon of the 19th, extending southward over the northern slope of the Rocky Mountains. The area moved eastward, its centre remaining to the north of the region of observation until 10 p. m. of the 20th, when it was central over Lake Superior, and at the following observation it had combined with the area of low pressure described above as number v. It was attended by a slight rise in temperature over Montana, Dakota, and Minnesota. Fair weather prevailed within the area until 3 p. m. of the 20th, when light snows occurred in Minnesota. The wind attained velocities of from thirty to forty miles on the 20th.

VII.—This depression was central north of Montana at 3 p. m. of the 22d. It moved in a southeasterly direction until the afternoon of the 26th; when central near the thirty-third parallel the direction changed to northeast, and it passed to the northward of the region of observation after 10 p. m. of the 26th. The lowest pressure observed during the existence of the area was 29.36, at Fort Elliott, Tex., at 3 p. m. of the 24th, previous to which time the pressure at the centre had been near 29.7, and it subsequently increased to 29.6. The area was attended by fair weather and light winds over the Rocky Mountain districts during the 23d. On the afternoon and night of the 24th precipitation became general within its limits over the northern and middle slopes of the Rocky Mountains, the west Gulf states, the Missouri Valley, the Ohio Valley; and on the 25th over all districts east of the Mississippi River, except the New England States, and continued during the 26th. This precipitation was mostly in the form of rain, snow occurring at extreme northern stations of the United States. The temperature rose generally in advance of the area, the greatest rise being in the northwest, diminishing as the storm progressed eastward. The winds were light to fresh, except over the Lakes, where maximum velocities of thirty miles or more occurred.

VIII.—This depression apparently formed over the Gulf of Mexico on the edge of the preceding area. It moved rapidly to the northeast. At 3 p. m. of the 28th the isobar of 29.8 inclosed a narrow trough extending along the Appalachian Mountains from the Gulf of Mexico to the upper Saint Lawrence valley. Becoming nearly circular in shape the area passed to the Gulf of Saint Lawrence, the pressure having declined to 29.28 at Anticosti at 3 p. m. of the 29th. Rain, which had begun under the influence of the preceding area of low pressure, was continued over the eastern Gulf states, the south and middle Atlantic states, the upper Ohio valley, and the lower lake region from the 26th to the 29th, some stations in the eastern Gulf and south Atlantic states reporting unusually heavy rainfalls.

The following are some of the special rainfalls reported: 26th, 3 p. m., Pensacola, Fla., 2.14; Montgomery, Ala., 2.01; Atlanta, Ga., 1.10; Charleston, S. C., 0.60. 26th, 10 p. m., New Orleans, La., 1.02; Mobile, Ala., 0.82; Pensacola, Fla., 0.94; Charleston, S. C., 1.02. 27th, 7 a. m., Montgomery, Ala., 2.25. 27th, 3 p. m., Montgomery, Ala., 2.18; Atlanta, Ga., 1.40. 28th, 3 p. m., Atlanta, Ga., 1.14. 29th, 3 p. m., Raleigh, N. C., 1.01. The winds were generally light to fresh, but attained velocities of twenty-five to thirty miles on the coast of the south Atlantic states on the 29th. Only a slight rise in temperature occurred to the east of the Appalachian Mountains, while a fall of 10° to 20° occurred to the west, owing to the approach of a high area from that direction.

The maximum temperature of the month occurred at many stations in the south Atlantic and east Gulf states on the 28th and 29th.

IX.—This area was apparently central to the north of Montana at 3 p. m. of the 27th. It moved to the southeast until central near the one hundred and fourth meridian when its path curved to the northwest, and the area was central near Spokane Falls, Wash., where the pressure was reported 29.54, the lowest during its continuance. From this position it again moved southeast, the central pressure increasing to 29.8, and the direction changed near the fortieth parallel to slightly north of east. It was accompanied by light winds, with occasional light snows, over the northern slope on the 27th and 28th. Precipitation was very light over the Ohio Valley, the Lake region, and the New England States. The temperature rose slightly in advance of the area, in only a few instances amounting to as much as 20° in twenty-four hours. During the prevalence of the area the maximum temperature of the month occurred at a number of stations along the Atlantic coast on the 31st.

Under the influence of an area of low pressure central on the coast of Washington Territory on the 31st (which will be described in the April REVIEW), the maximum temperature of the month occurred over southern Wyoming, Colorado, New Mexico, Indian Territory, Texas, except along the Gulf coast, Arkansas, and southern Missouri on the 31st. Fort Elliott, Tex., reported a higher maximum temperature than was ever before observed at that station in March.

NORTH ATLANTIC STORMS FOR MARCH, 1888.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that appeared over the north Atlantic Ocean during March, 1888, have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Of the seven depressions traced, two, numbers 3 and 6, first appeared east of the twentieth meridian and occasioned severe storms over the British Isles during the second and third decades of the month. Over the western portion of the ocean the weather was very severe during the first and second decades, attending the presence of depressions numbers 1 and 4, which were remarkable alike for their great strength and by reason of their irregular movements. Of the remaining depressions, number 5, alone, evidenced marked energy.

In March, 1887, eleven depressions were traced, the tracks largely predominating to the southeastward and southward of Newfoundland and Nova Scotia, where their rate of progression was, in general, slow, and their course of movement greatly diversified. During the first two decades of the month the more important storms which appeared were confined to the western half of the ocean, where deep barometric depressions, accompanied by storms of great violence, followed one another in rapid succession. During this period the barometric pressure over the eastern portion of the ocean remained almost continuously high, with generally settled weather. During the last decade of the month cyclonic areas traversed the ocean from coast to coast, and the region of greatest storm frequency was included within an area extending from the east edge of the Banks of Newfoundland to the west coasts of the British Isles.

As compared with the corresponding month of previous years, the depressions traced for March, 1888, were deficient in number, and, as a whole, in energy. The severe weather which prevailed west of the fortieth meridian from the 12th to the 16th, inclusive, and over the British Isles and adjacent ocean during portions of the second and third decades, constituted noteworthy features, and the destructive character of the storms of those periods may be attributed rather to their persistence than to exceptional energy on the part of the depressions which they attended. A characteristic of the four important depressions which appeared, numbers 1, 3, 4, and 6, was the extreme irregularity and slowness of their progressive movement, which resulted in an unusual continuation of gales and high, confused seas in the regions in which they prevailed.

In the following descriptions of the depressions traced, their abnormal features will be considered in connection with the general meteorological conditions which existed over the ocean during their prevalence:

1.—This depression was central on the 1st off the southeast edge of the Banks of Newfoundland, and during the five following dates pursued a diversified course over or near the Grand Banks; subsequent to the 6th the centre of depression moved east-northeast, and disappeared over the British Isles after the 11th. On the 1st barometric pressure falling to about 29.10 (739.1) was shown in N. 42°, W. 45°, and strong to whole gales prevailed between the thirtieth and fiftieth meridians. By 12 noon, Greenwich time, of the 2d the storm-centre had advanced northeast to the forty-fifth parallel, and a subsidiary depression was apparently central over Newfoundland. To the eastward of the twentieth meridian, and off the coast of the United States, the pressure rose above 30.30 (769.6). By the 3d the centre of depression had recurved southwest to N. 42°, W. 47°, with barometric minimum below 28.80 (731.5). As no secondary depression appeared on this date, it is assumed that the one indicated over Newfoundland on the 2d had moved southeast and united with the principal area of low, and it is not improbable that the presence and advance from the westward of this secondary low contributed, together with the high barometer which prevailed over the eastern part of the ocean, to impart the abnormal southwest course assumed by the depression from the 2d to the 3d. By the 4th the centre of disturbance had moved westward to the fifty-fifth meridian, with slight changes in barometric minima. On this date the pressure was high east of the thirtieth meridian, while along the coast of the United States the barometer readings were somewhat lower than on the preceding date. Subsequent to the 4th the depression moved eastward, and from the 5th to the 11th, inclusive, followed a normal track to the British Isles, attended throughout by pressure falling below 29.00 (736.6), and strong to whole gales.

2.—This was an unimportant though well-defined depression which moved eastward along or near the fortieth parallel, between the fortieth and sixtieth meridians, from the 10th to the 12th, inclusive.

3.—This depression was central on the 12th in N. 52°, W. 19°, whence it had advanced from the northwest. On this date central pressure about 29.10 (739.1) was shown, and fresh to whole gales prevailed east of the thirty-fifth meridian. At noon, Greenwich time, of the 13th the depression was central off the southwest coast of Ireland, and during the next twenty-four hours moved slowly eastward over Ireland, with minimum pressure about 29.10 (739.1). By the 15th there was no appreciable change in the position or included barometric readings of the depression. By the 16th the storm-centre had moved east or south of east, and a rapid increase in pressure and fresh northerly gales occurred over the Baitish Isles.

4.—A history of the depression of which this storm was the continuation is given in detail under the heading "Areas of low pressure."

On the 14th the storm was central in N. 42°, W. 58°, with minimum pressure about 29.40 (746.7). On this date a steep barometric gradient existed eastward to the fortieth meridian and northeastward to Newfoundland, where the pressure rose above 30.10 (764.5). To the westward of the principal storm-area, and in close proximity to the American coast, the presence of a subsidiary area of low was indicated. By the 15th the depression southeast of Nova Scotia on the 14th had recurved two degrees to the westward, this abnormal movement being evidently due to the presence to the eastward and northeastward of an area of relatively high pressure, whereby its eastward progress was obstructed, and as a contributory cause the attraction offered by the approach from the westward of the secondary depression, with which it united, may be considered. Subsequent to the 15th the depression pursued a normal east-northeast to northeast track and disappeared north of the region of observation, in the vicinity of the twenty-fifth meridian, after the 19th; its passage being attended during the 16th and 17th by pressure falling below 29.00 (736.6), after which a marked loss of energy was apparent.

The following special reports show the general character of disturbances which attended the passage of this depression on the ocean:

Captain Klinkshel, of the s. s. "Andes," reports: "March 11th, 4 a. m., wind se., force 4, increasing to 6; barometer, 30.32 (770.1) and falling. Noon, in N. 31° 19′, W. 73° 43′, wind very unsteady; barometer, 30.01 (762.2); 4 p. m., wind sse., increasing and squally; barometer, 29.99 (761.7); air, 54°; 8 p. m., wind blowing a gale and increasing; barometer, 29.57 (751.1); 9 p. m., barometer, 29.35 (745.5), lowest; air, 54°; 10 p. m., wind, sse., strong gale, increasing and heavy sea from se.; 11 p. m., wind died out and for ten minutes there was a dead calm with sky very dark and threatening; very heavy squalls of rain; barometer steady at 29.35 (745.5); the wind then jumped out from wnw. and blew with hurricane force; barometer commenced to rise and at midnight was 29.61 (752.1) and rising rapidly. March 12, 4 a. m., wind nw., hard gale with a tremendous heavy sea and fierce squalls; barometer, 29.61 (752.1); air, 54°; gale continued with unabated force; 6 a. m., barometer, 29.63 (752.6); noon, very heavy gale and sea; sky covered; barometer rising, N. 34° 20′, W.

73° 42′; 6 p. m., wind still nw. but moderating; barometer, 29.93 (760.2), weather unsettled; the wind continued to decrease in force and the barometer to rise until midnight, when it stood at 29.96 (761.0). It then commenced to fall slowly and the wind increased to a moderate gale and continued squally and unsettled throughout March 13th, in N. 36° 21′, W. 73° 36′, at noon. High westerly winds and squally weather continued until 10 p. m., March 14th, then fine weather throughout the remainder of the passage." Captain Cates, of the brig "Arcot," reports: "March 12th, laying off Five-fathom Bank Lightship, Capes of Delaware, in easterly storm and bad cross sea, ne. and ese.; barometer, 29.20 (741.7). At 1 a. m., local time, was struck by a violent hurricane from the nnw., accompanied by blinding snow, completely overwhelming the vessel in the wild confused sea, and blew the sea half-mast high. Bore off before the gale which blew at the rate of eighty to ninety miles an hour for twenty-four hours, accompanied with snow and hail all the while. March 13th, wind backed to nw. by w., whole gale, with heavy squalls of hail and rain, lasting forty-eight hours."

Captain Aitkenhead, of the brig "Arcot," reports: "March 13th, in N. 37° 57′, W. 63° 02′, gale commenced from nw., force 8; noon, w., force 8, barometer 29.48 (723.4). March 14th, in N. 39° 05′, W. 65° 10′, wind hauled to nw. by n., force 8, and continued till 5 p. m., force 7–8, barometer at noon 29.43 (747.5). March 15th, in N. 39° 40′, W. 67° 17′, gale continued from ne. to n. by e., force 9–10, and then moderated, barometer 29.61 (752.1)." Captain Fitt, of the s. s. "Brooklyn City," reports: "March 13th, 9 p. m., 75th meridian time, in N. 40° 48′, W. 64° 20′, barometer 29.19 (741.1), (lowest). March 16th, 3 p. m., gale set in from w. to wsw., highest force 10, lowest barometer 28.69 (728.7), position N. 43° 10′, W. 50° 40′." Captain Sullivan, of the New York pilot boat "Caprice," reports: "March 11th, midnight, calm, overcast, dark, and gloomy, with steady fall of heavy rain, barometer 29.80 (756.9). March 12th, 4 a. m., wind came out suddenly from nne., a moderate gale, barometer 29.70 (754.1), vessel about 33 miles se. of Sandy Hook; from 5 to 6 a. m. wind n., increasing in force; 6 a. m. blowing a hurricane from nnw., barometer oscillating between 29.60 (751.8) and 29.70 (754.4), high cross sea from se. and ne., snowing, and blowing spray; 8 a. m., barometer 29.50 (749.3); lowest barometer, 29.20 (741.7), at noon of the 12th; gale commenced to moderate at 11 a. m. of the 13th, with rising barometer." Captain Catherine, of the s. s. "City of Augusta," reports a gale of force 10 on the 11th and 12th, wind veered from se. to s. and nw., lowest barometer, 29.35 (745.5), at 1 a. m. of the 12th, in N. 35°, W. 75° 20′. Captain Henderson, of the s. s. "Colon," reports a severe gale on the 11th, wind veered suddenly from se. to w. and nw., very heavy confused sea, heaviest from the northward, barometer 29.60 (751.8) at 11.03 p. m., in N. 35° 20′, W. 74° 00′. Captain Hedderwick, of the s. s. "Furnessia," reports a gale of force 11 on the 12th and 13th, wind shifted to from n. to nnw. and nw., barometer 29.26 (743.2) at 7.45 a. m., in N. 39° 24′, W. 71° 47′. Captain Urquhart. of the s. s. "Lord Clive," reports a hurricane on the 12th; wind veered from ese. to sw. and nw., with tremendous high and cross seas, barometer 29.21 (741.9) at 11 a. m., in N. 39° 14′, W. 72°.

Captain Haggett, of the s. s. "Lydian Monarch," reports a gale of force 11 on the 13th; wind set in from sw., shifting to se., s., and sw.; barometer 29.05 (737.9) at 5 p. m., in N. 40° 30′, W. 66° 50′. Captain Higgins, of the schr. "Lida Fowler," reports: "13th, 8 a. m., barometer, 29.39 (746.5); snow; noon, N. 38° 00′, W. 70° 10′; moderate westerly winds; occasional snow squalls; 8 p. m., moderate nw. gale; barometer, 29.59 (751.6); 14th, barometer, 29.79 (756.7); light breeze from nnw.; 4 p. m., fresh nnw. gale; midnight, barometer 29.79 (756.7); strong gale. During the 15th, strong gale, wind backing to sw., then out to nw.; rising barometer." Captain Elliott, of the s. s. "Nessmore," reports a heavy gale on the 13th and 14th; wind shifted suddenly in fierce squalls into the s., se., sw., and wsw., with raging cross seas from every point of the compass; lowest barometer, 29.10 (739.1), at noon of the 13th, in N. 39° 48′, W. 60° 45′. On the 16th, in N. 42° 43′, W. 43° 31′, at 5.55 p. m. a gale set in from the sw. and veered to w. and nw.; highest force 10; lowest barometer, 28.73 (729.7). Captain Fry, of the s. s. "City of Lincoln," reports a gale of force 10 on the 14th and 15th; wind set in from wsw. and shifted to wnw.; lowest barometer, 29.51 (749.5), at 8.48 p. m. of the 14th, in N. 31° 44′, W. 63° 38′. Captain Brunn, of the s. s. "Fædrelandet," reports: "14th, 1 a. m., in N. 33° 30′, W. 75° 05′, barometer 29.72 (754.9); between 4 and 8 a. m. the air had a very ugly appearance, stormy-looking, with numerous small water-spouts, and masses of dripping fog." Captain Meyer, of the bark "Johanna," reports: "14th, in N. 33° 51′, W. 73° 20′, n. to nw. gale, at times of hurricane force, continued all day." Captain Fletcher, of the schr. "Melissa Trask," reports: "14th, in N. 34° 20, W. 72° 20′, at noon, barometer, 30.23 (767.8), wind, nnw. gale with confused sea." Captain Thompson, of the s. s. "Stockholm City," reports a gale on the 13th: wind set in from e. by n., and ended from s.; lowest barometer, 29.23 (742.4), in N. 42° 25′, W. 64° 40′.

5.—The presence of this depression about two degrees northwest of Bermuda was shown by reports of the 18th, on which date pressure falling to 29.50 (749.3) was reported in that locality. Moving rapidly northeast the storm was central on the 19th over the Banks of Newfoundland, with pressure somewhat lower than on the preceding day, and strong to whole gales over a limited area. By the 20th the depression had moved eastward six degrees, with a marked increase in pressure, after which it apparently dissipated.

6.—From the 22d to the 25th, inclusive, the winds along the west-central coast of Europe were cyclonic, and the barometer fell steadily. At noon, Greenwich time, of the 26th the pressure was slightly below 29.00 (736.6) off the southern coasts of the British Isles, and the presence of a storm-centre south of Ireland was indicated. By the 27th the centre of depression had moved eastward toward the French coast, with a slight increase in pressure. By noon of the 28th the storm had recurved southwestward to N. 47° 30′, W. 9° 30′, with minimum below 28.80 (731.5), from which position it moved eastward over northwestern France during the 29th, with pressure about 28.70 (729.0), and disappeared over the North Sea. This depression apparently originated east of the tenth meridian, and while marine observations admit of approximately defining its path from the 26th to the 29th, inclusive, its history previous and subsequent to the period embraced by those dates cannot, at present, be determined, owing to an absence of reports from European land stations.

7.—This was a depression of moderate energy which moved eastward over Newfoundland during the 30th, and advanced east-southeast along the northern edge of the Grand Banks during the early morning of the 31st; its passage being unattended by noteworthy features.

OCEAN ICE.

On chart i the positions of icebergs and field ice reported during the month are shown by ruled shading. The following report of ice movements at Saint John's, N. F., has been made by Mr. Jno. Higgins, observer at that point: "Ice closed in on the land on the 4th and 5th, driving off on the 6th; 9th, harbor blocked with ice, which extended as far as the eye could reach; 10th to 16th, harbor blocked with ice; 19th, ice driving in again; 25th, ice driving off slowly; 26th, ice packed in on the land; 30th, ice driving off fast." On the 1st the s. s. "Oregon" rounded the southernmost point of field ice in N. 46° 38′, W. 47° 26′, and in N. 47° 23′, W. 46° 56′ passed field ice and several large pieces. 2d, s. s. "Château Leoville" passed ice fields and pieces of ice in N. 43° 50′, W. 52° 10′. 3d, s. s. "Portia" reported field ice along the southeast coast of Newfoundland and the northeast coast of Cape Breton and Saint Pierre. 13th, s. s. "Colima" passed two ice floes and field ice in N. 44° 18′, W. 59° 26′. 16th, s. s. "Vancouver" encountered field ice

from N. 43° 56′, W. 56° 02′ to Chebucto, N. S. 22d, heavy close-packed ice moved south off Saint John's, N. F. 22d, s. s. "Milanese," in N. 42° 30′, W. 50° 37′, saw field ice to the northward; s. s. "Panama," Cape Race bearing twenty miles northwest, passed an enormous iceberg and a large ice-field. 29th, heavy close-packed ice moved south off Saint John's N. F. While the general drift of the ice reported off Newfoundland was southerly, during the prevalence of strong easterly winds in the middle portion of the month it packed in close to the shore, blocking vessels until dispersed by westerly winds. Interspersed with the field ice many icebergs were observed. As compared with February, 1888, field ice was reported about two degrees farther south, while the eastern limit was over one degree farther west.

Compared with the record for corresponding months of previous years, the quantity of ice reported for March, 1888, was greatly deficient; the southernmost ice encountered was about one and one-half degrees north of the average southern limit, and the easternmost ice was more than three degrees west of the average eastern limit. Reports do not show that a general breaking up of ice massed along the Labrador coast had occurred by the close of the month, or that vessels had effected the passage of Belle Isle Strait, which facts indicate an unusual delay in the annual southern movement of the Arctic ice-fields.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for March during the last six years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
March, 1882	42 30	50 00	March, 1882	46 30	46 00
March, 1883	41 46	49 48	March, 1883	48 40	43 03
March, 1884	41 20	54 06	March, 1884	45 00	40 15
March, 1885	40 55	49 04	March, 1885	45 57	43 15
March, 1886	40 20	49 02	March, 1886	47 20	44 40
March, 1887	41 00	49 07	March, 1887	45 31	42 56
March, 1888	42 30	50 37	March, 1888	47 23	46 56

FOG.

The limits of fog-belts to the westward of the fortieth meridian are shown on chart i by dotted shading.

As compared with the chart for February, 1888, the limits of the Newfoundland fog-belt have extended about two degrees southward and eastward, and the number of days during which fog prevailed, sixteen, was one less than the aggregate number of foggy days reported for the preceding month. To the westward of the Grand Banks fog was less frequently encountered, and the southern limit was about the same, except along the coast, where it was about three degrees farther north than in February. With the exception of the 27th and 28th, when northeast winds and high barometer prevailed, the development of fog near Newfoundland attended the approach or passage of cyclonic areas. On the six days for which fog was reported between the fifty-seventh and sixty-fifth meridians, cyclonic areas were central either to the southeast of Nova Scotia or over the Gulf of Saint Lawrence. On the six dates during which fog prevailed along the coast of the United States, the winds were south to east, with falling barometer, except in one instance, when they were northwesterly. A study of the meteorological conditions which attended the development of fog west of the fortieth meridian during March, 1888, shows its dependence upon the cyclonic circulation of winds. In this, as in all preceding months for which fog reports have been received, an observable feature is the almost absolute certainty with which the presence of fog can be anticipated in the vicinity of Newfoundland, following a shift of wind to the south and east quadrants, with the approach of an area of low barometric pressure; its disappearance, with west to north winds, consequent upon the advance of a cyclonic area to the eastward of the Banks, is in a like degree observable.

The following are the limits of fog-areas on the north Atlantic Ocean during March, 1888, as reported by shipmasters:

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
		° ′	° ′		° ′	° ′	
3	Fog at Saint John's, N. F.						
3	S. S. State of Texas	38 12	74 28	4 a. m.	37 03	74 56	9 a. m.
4–5	Fog at Saint John's, N. F.						
5–6	S. S. Duke of Buckingham	43 32	50 05	6 p. m.	44 04	48 08	2 a. m.
13	S. S. Rugia	41 30	50 53	6.24 a. m.	41 30	50 01	
14	S. S. Stockholm City	42 32	65 00		42 27	63 50	
15	S. S. Stockholm City	42 20	60 30		42 18	59 54	
15	Fog at Saint John's, N. F.						
15	S. S. Oxford	41 47	47 56	10.12 a. m.	42 07	46 35	6.06 p. m.
15–16	S. S. LaBourgogne	44 42	51 17	11 p. m.	43 48	55 21	9 a. m.
16	S. S. Servia	43 15	48 50	2.46 a. m.	42 54	50 13	7.15 a. m.
16	S. S. Brooklyn City	43 15	49 20	9 p. m.	43 17	48 40	11 p.m.
18	S. S. Stockholm City	43 50	49 25		44 10	47 58	
21	S. S. Pennland	40 39	46 44	9 p. m.	40 40	46 31	10 p. m.
21	S. S. Eider	Off Fire Island.					
21	S. S. Persian Monarch	42 20	69 00	10 a. m.	42 20	70 20	8 p. m.
21–22	S. S. Zeeland	40 45	47 50	Midnight.	40 40	48 15	2 a. m.
22	S. S. Thingvalla	42 54	52 40		43 08	51 53	
22	S. S. Indiana	41 17	47 07	2.58 a. m.	41 03	47 37	5.28 a. m.
22–23	S. S. Australia	44 19	48 04	8 p. m.	43 10	52 00	Noon.
22–23	S. S. Buffalo	42 11	53 57	11 p. m.	42 10	54 25	
22–24	S. S. Alcides	47 30	42 15	11 p. m.	43 40	51 00	6 p. m.
22–24	S. S. Bothnia	41 50	63 00	4 p. m.	41 45	64 20	7 p. m.
23	S. S. LaBretagne	42 24	57 06	9.30 a. m.	42 20	57 32	10.30 a. m.
23	S. S. Norwegian	42 00	49 46		42 10	50 00	
23–24	S. S. Lake Ontario	45 30	45 00	8 a. m.	43 00	52 00	8.32 a. m.
23–24	S. S. State of Nebraska	46 26	44 10	Noon.	43 22	51 33	7 p. m.
24	S. S. Thingvalla	47 19	43 27		48 32	41 58	
24	S. S. Italy	43 43	48 17	8.33 a. m.	43 06	50 47	11.08 p. m.
24	Fog at Saint John's, N. F.						
24	S. S. Mareca	40 28	48 48	8 a. m.	40 34	48 16	11.45 a. m.
26–26	Bg. Energy	40 13	71 57	8 a. m.	40 33	71 51	4 a. m.
27	S. S. Republic	43 38	48 36	3.30 p. m.	43 20	50 22	8.15 p. m.
27	S. S. Holland	40 35	70 00	9 a. m.	New York.		
27–28	S. S. City of Washington.	36 25	74 35	3 p. m.	Staten Island.		
27–28	S. S. Lorenzo D. Baker	36 50	72 20	10 p. m.	40 01	72 11	9 a. m.
28	S. S. LaChampagne	46 08	40 31	3.34 a. m.	45 55	41 19	5.30 a. m.
28	do	45 30	42 55	9.50 a. m.	45 24	43 19	
28	S. S. Italy	41 07	66 15	4.20 a. m.	40 39	68 49	7.52 p. m.
28	S. S. Iowa	42 22	66 11	10.30 a. m.	42 23	70 35	11.40 p. m.
28–29	S. S. Waesland	40 25	65 22	10.30 a. m.	40 28	72 20	3.30 p. m.
28–29	S. S. Lorenzo D. Baker	Vineyard Sound.			Nantucket Shoals.		
29	S. S. Italy	40 22	70 59	6.13 a. m.	40 17	72 26	12.50 p. m.
29	S. S. Zaandam	41 06	64 00		41 03	65 04	
29	S. S. Republic	41 50	61 45	8 a. m.	41 40	63 10	1.50 p. m.
29	S. S. British Princess	41 06	49 05	1 a. m.	41 02	49 17	2 a. m.
30	S. S. Erin	42 46	49 29		42 31	50 56	
30	S. S. Vaderland	41 17	49 54	0.30 a. m.	41 11	50 23	2.30 a. m.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for March, 1888, is exhibited on chart ii by dotted isothermal lines. In the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal, and subtracting when above.

March, 1888, was colder than the average over nearly the whole country, and in the northern districts from the Lake region westward to the Rocky Mountains the month was comparatively a remarkably cold one, the monthly mean temperatures ranging from 4° to 10° below the normal; a marked departure from the normal temperature also occurred in the middle and southern Rocky Mountain slopes. In the other districts, where the temperature was below normal, the departures were not marked. In the extreme northern portion of New England and the adjacent Canadian Provinces the month was considerably warmer than the average; the contrast between the temperature conditions of these districts and those lying immediately to the westward forms a noteworthy feature, Albany, N.

Y., showing 6° below the normal, and Chatham, N. B., 7° above. On the Pacific coast, in the south Atlantic states, and from the Ohio River southward to the Gulf, the temperature departures, while below the normal, were not marked, being less than 1° at many stations, particularly on the Pacific coast.

It will be seen from the table of maximum and minimum temperatures that during March, 1888, the minimum temperatures were the lowest that have yet been recorded at numerous stations in the Missouri Valley, northern slope, and north Pacific coast region, and at a few other stations located in the following states, viz., Virginia, Arkansas, and California. But one station reports a maximum temperature higher than any previously recorded, viz., Fort Elliott, Tex., 87°, which is 1° higher than any former record. At Lynchburg, Va., and Charlotte, N. C., the maximum temperatures were within half a degree of the highest on the records of those stations.

Table of comparative maximum and minimum temperatures for March.

State or Territory.	Stations.	For 1888.		Since establishment of station.				Length of record.
		Max.	Min.	Max.	Year.	Min.	Year.	
		°	°	°		°		Yrs.
Alabama	Mobile	75.5	35.0	85.0	1879	29.0	1885	18
Do	Montgomery	82.1	30.8	86.3	1882	25.0	1873	16
Arizona	Prescott	69.0	5.0	90.0	1879	— 8.0	1876	12
Do	Fort Apache	.....	.....	83.0	1879	11.0	1881	10
Arkansas	Fort Smith	83.6	23.0	82.8	1884	23.5	1884	6
Do	Little Rock	80.5	25.2	83.0	1882	23.0	1886	9
California	San Francisco	73.7	38.0	78.0	1887	39.0	1880	18
Do	San Diego	72.0	41.0	99.0	1879	38.0	1880	17
Colorado	Denver	70.0	— 1.5	81.0	1879	—10.7	1886	16
Do	Montrose	66.0	6.9	72.5	1887	7.2	1886	4
Connecticut	New Haven	55.0	5.0	69.0	1880	— 0.2	1885	16
Do	New London	58.0	12.0	64.0	1878	4.0	1884	16
Dakota	Fort Buford	51.0	—27.8	70.0	1879	—23.0	1880	10
Do	Yankton	69.2	—17.5	87.0	1879	—16.0	1880	15
Dis. of Columbia	WashingtonCity	75.6	10.0	79.0	1880	4.0	1873	18
Florida	Jacksonville	83.5	35.0	88.0	1882	31.0	1873, 1876	17
Do	Key West	81.8	58.4	89.0	1873, 1874	53.0	1886	16
Georgia	Atlanta	77.3	24.0	81.0	1882	20.4	1885	10
Do	Savannah	78.5	32.0	87.0	1882	27.0	1873	18
Idaho	Boise City	66.0	17.7	76.0	1881	9.0	1872	11
Illinois	Cairo	76.2	21.0	84.0	1879	10.0	1873	17
Do	Chicago	64.0	— 0.9	73.0	1875	—12.0	1873	16
Indiana	Indianapolis	69.0	8.8	77.0	1875	3.2	1885	15
Indian Ter	Fort Sill	86.5	19.7	95.0	1879	10.0	1880	11
Iowa	Dubuque	57.5	— 4.6	75.0	1875	—10.0	1875	15
Do	Des Moines	72.9	— 4.6	80.0	1880	— 5.6	1884	10
Kansas	Dodge City	75.0	— 1.8	89.0	1879	— 8.0	1880	15
Do	Leavenworth	78.5	10.8	84.0	1879	2.0	1876	17
Kentucky	Louisville	73.5	13.8	79.3	1887	3.0	1873	16
Louisiana	New Orleans	78.0	40.7	84.0	1879	30.0	1885	18
Do	Shreveport	81.0	32.5	90.0	1882	26.0	1876	15
Maine	Eastport	48.0	3.9	53.0	1878	— 7.9	1886	15
Do	Portland	47.1	7.3	65.0	1874	— 7.0	1872	17
Maryland	Baltimore	73.5	12.0	76.0	1880	5.0	1873	16
Massachusetts	Boston	57.5	11.8	72.0	1880	— 7.5	1872	18
Michigan	Marquette	40.4	—13.8	70.0	1878	—16.0	1884	14
Do	Grand Haven	63.7	1.0	71.0	1878	— 4.9	1885	16
Minnesota	Saint Vincent	40.7	—29.3	49.0	1881	—31.0	1883	8
Do	Saint Paul	42.0	—13.7	68.0	1879	—22.5	1873	16
Mississippi	Vicksburg	83.5	31.2	85.0	1878, 1880	27.0	1885	16
Missouri	Saint Louis	76.0	14.0	82.0	1879	8.0	1876	18
Montana	Ft. Assinaboine	60.2	—26.0	68.2	1885	—25.8	1884	8
Do	Helena	63.5	—13.0	67.4	1887	—10.0	1886	8
Nebraska	North Platte	74.0	—13.7	86.0	1879	—21.0	1880	14
Do	Omaha	78.3	3.9	82.0	1879	— 7.0	1880	16
Nevada	Winnemucca	70.7	10.0	82.0	1879	— 3.0	1883	11
New Jersey	Atlantic City	69.5	10.0	72.0	1880	8.0	1884	15
New Mexico	Santa Fé	64.0	14.0	82.0	1879	0.0	1880	16
New York	Buffalo	63.0	1.6	72.0	1875	— 4.1	1885	16
Do	New York City	62.9	4.8	72.0	1879	3.0	1873	17
North Carolina	Charlotte	79.3	20.0	79.7	1887	23.0	1884	10
Do	Wilmington	76.5	24.4	84.0	1878	20.0	1873	18
Ohio	Cincinnati	70.9	12.3	77.0	1875	1.0	1873	16
Do	Sandusky	71.6	6.1	76.0	1886	— 3.4	1885	11
Oregon	Portland	67.5	24.5	79.0	1886	25.5	1880	15
Do	Roseburg	71.2	23.0	81.0	1887	19.0	1880	11
Pennsylvania	Pittsburg	71.5	9.1	80.0	1876	2.0	1877	15
Do	Philadelphia	70.0	8.2	75.0	1880	5.0	1872	18
Rhode Island	Block Island	51.7	14.6	56.0	1886	5.8	1886	8
South Carolina	Charleston	74.0	29.5	85.0	1882	28.0	1876	15
Tennessee	Knoxville	76.4	19.0	83.0	1882	6.0	1873	18
Do	Memphis	80.0	26.0	85.0	1879	18.0	1876	16
Texas	Brownsville	85.0	45.1	92.3	1884	35.0	1880	13
Do	Fort Elliott	87.2	8.6	86.0	1880	— 2.0	1880	9
Utah	Salt Lake City	68.5	19.0	77.0	1879	4.0	1874	15
Virginia	Lynchburg	80.1	16.5	80.6	1887	16.0	1884	15
Do	Norfolk	76.8	14.1	81.0	1880	16.0	1872	18
Washington	Spokane Falls	62.1	11.9	74.0	1881	7.0	1882	8
Do	Olympia	64.8	23.0	71.0	1881	23.0	1880	11
Wisconsin	La Crosse	48.8	— 9.7	72.0	1875	—23.0	1873	16
Do	Milwaukee	60.5	— 2.3	70.0	1878	— 8.5	1884	18
Wyoming	Cheyenne	64.2	— 4.8	77.0	1879	—17.0	1880	16

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for March, 1888; (4) the departures of the current month from the normal; (5) and the extreme monthly means for March during the period of observations and the year of occurrence:

State and Station.	County.	(1) Normal for the month of March.	(2) Length of record.	(3) Mean for March, 1888.	(4) Departure from normal.	(5) Extreme monthly mean temperature for March.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	43.6	6	46.2	+2.6	55.3	1882	45.5	1885
California.									
Sacramento	Sacramento	54.4	22	50.7	—3.7	59.1	1877	46.1	1880
Salinas	Monterey	50.7	16	50.2	—0.5	.....	.....	.....	.....
Florida.									
Merritt's Island	Brevard	65.0	5	65.0	0.0	69.6	1884	63.2	1885
Illinois.									
Golconda	Pope	45.6	10	43.4	—2.2	.....	.....	.....	.....
Peoria	Peoria	38.2	32	37.1	—1.1	.....	.....	.....	.....
Riley	McHenry	29.8	27	26.1	—3.7	.....	.....	.....	.....
Indiana.									
Blue Lick	Clark	42.6	11	39.9	—2.7	.....	.....	.....	.....
Logansport	Cass	41.1	33	34.8	—6.3	.....	.....	.....	.....
Spiceland	Henry	37.0	34	35.3	—1.7	.....	.....	.....	.....
Vevay	Switzerland	42.8	21	39.8	—3.0	.....	.....	.....	.....
Iowa.									
Cresco	Howard	25.2	16	19.6	—5.6	.....	.....	.....	.....
Kansas.									
Lawrence	Douglas	41.6	20	38.6	—3.0	51.2	1868	34.2	1876
Wellington	Sumner	43.5	10	42.6	—0.9	49.6	1879	39.0	1883
Louisiana.									
Point Pleasant	Tensas	56.7	8	54.6	—2.1	.....	.....	.....	.....
Grand Coteau	Saint Landry	61.1	6	59.6	—1.5	.....	.....	.....	.....
Maine.									
Gardiner	Kennebec	29.5	52	28.9	—0.6	35.0	1843	20.8	1885
Maryland.									
Cumberland	Alleghany	37.3	16	35.7	—1.6	46.0	1878	30.0	1875
Massachusetts.									
Somerset	Bristol	34.0	18	32.4	—1.6	.....	.....	.....	.....
Worcester	Worcester	33.0	50	27.8	—5.2	40.7	1842	23.3	1885
Nevada.									
Carson City	Ormsby	40.9	9	40.6	—0.3	47.2	1885	33.5	1880
Michigan.									
Thornville	Lapeer	30.5	12	26.8	—3.7	.....	.....	.....	.....
Kalamazoo	Kalamazoo	31.3	13	27.8	—3.5	.....	.....	.....	.....
New Jersey.									
Moorestown	Burlington	37.4	25	32.9	—4.5	45.4	1871	29.7	1885
South Orange	Essex	35.6	18	30.6	—5.0	42.5	1878	28.8	1872
New York.									
North Volney	Oswego	27.8	21	23.1	—4.7	18.6	1885	37.4	1878
Palermo	Oswego	27.5	35	22.6	—4.9	38.0	1878	17.1	1885
Ohio.									
Wauseon	Fulton	32.4	18	29.7	—2.7	43.2	1878	24.5	1885
Oregon.									
Albany	Linn	47.0	9	46.1	—0.9	.....	.....	.....	.....
Pennsylvania.									
Dyberry	Wayne	28.7	24	23.4	—5.3	37.5	1878	19.5	1885
Grampian Hills	Clearfield	30.1	24	28.1	—2.0	40.0	1878	20.1	1885
South Carolina.									
Stateburg	Sumter	53.0	8	51.7	—1.3	59.0	1882	48.3	1885
Tennessee.									
Milan	Gibson	47.0	6	47.0	0.0	.....	.....	.....	.....
Texas.									
New Ulm	Austin	62.6	16	57.3	—5.3	62.4	1879	57.3	1888
Vermont.									
Strafford	Orange	25.8	14	23.2	—2.6	38.8	1878	17.1	1883
Virginia.									
Bird's Nest	Northampt'n	46.2	19	39.3	—6.9	54.1	1878	37.6	1872
Variety Mills	Nelson	43.7	11	40.5	—3.2	51.6	1878	37.1	1885
Wytheville	Wythe	42.4	24	41.3	—1.1	49.0	1878	37.0	1870, '72, 1881, '85
West Virginia.									
Helvetia	Randolph	39.0	12	37.7	—1.3	.....	.....	.....	.....

RANGES OF TEMPERATURE.

The monthly and the greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. In the Missouri Valley and northern Rocky Mountain slope the monthly ranges generally varied from 80° to 90°, the greatest, 93°, occurring at Crete, Nebr., and Fort Custer, Mont. As usual, the ranges were least at stations along the Gulf and Pacific coasts, where they were below 40°; Key West, Fla., reporting the least, 23°.

FROST.

Frosts were of daily occurrence in some part of the country throughout the month; they were most extensive about the 10th and least between the 25th and the close of the month. Some damage resulted from the frost of the 23d, principally in the south Atlantic states. In the Southern States frost occurred as follows:

Alabama.—Newton, 23d; Montgomery, 7th, 8th, 13th, 15th, 23d.

Florida.—Jacksonville, 12th, 15th; Pensacola, 6th; Cedar Keys, 12th.

California.—Los Angeles, 1st; Riverside, 1st, 2d, 4th, 6th.

Georgia.—Quitman, 8th, 14th, 15th, 23d.

Louisiana.—Alexandria, 10th, 19th, 24th to 26th; New Orleans, 8th, 13th, 14th.

Mississippi.—University, 12th, 13th, 15th; Vicksburg, 7th, 8th, 11th to 13th, 22d.

The following reports of destructive frosts have been received:

Charlotte, N. C.: the peach crop was reported to have been injured by the cold weather on the 23d.

Aiken, Aiken Co., S. C.: the frost of the 23d caused serious injury to the fruit crop; vegetation generally was damaged.

Savannah, Ga.: truck farmers report that the heavy frost on the 23d damaged vegetables to some extent.

Milledgeville, Baldwin Co., Ga.: the cold wave on the 23d was very destructive to tender vegetation; the peach crop was injured to a great extent.

Springfield Mo.: the peach buds were very much damaged by the frost on the 22d.

TEMPERATURE OF WATER.

The following table shows the temperature of the sea-water for March, 1888, observed, under conditions as given, at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Station.	Temperature at bottom.				Mean temperature of air at the station.	Average depth of water in feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
	°	°	°	°	°	
Canby, Fort, Wash						
Cedar Keys, Fla	71.0	56.0	15.0	63.5	61.4	8.2
Charleston, S. C	62.5	49.5	13.0	53.6	55.2	34.3
Eastport, Me	34.5	32.2	2.3	33.4	29.0	16.5
Galveston, Tex	65.5	53.0	12.5	61.2	60.1	14.9
Key West, Fla*						
New York City	39.3	29.7	9.6	32.3	32.0	14.8
Pensacola, Fla	66.8	57.5	9.3	61.5	59.5	17.8
Portland, Me	34.8	30.0	4.8	32.0	29.8	15.7
Portland, Oregon	49.5	43.0	6.5	46.0	46.2	51.9

* No thermometer at station.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for March, 1888, as determined from the reports of about eight hundred stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

In Florida, along the coasts of South Carolina and Georgia, in parts of the Lake region, New England, the southern slope, plateau districts, North Carolina, and Pacific coast, the precipitation of March, 1888, was below the average. No extended area of deficiency is shown, however, and, with the exception of northern Florida, where the rainfall was very light, the departures from the normal were not marked. Over much the larger portion of the country the rainfall exceeded the average for March. In portions of the east Gulf states monthly rainfalls of more than ten inches occurred; in the west Gulf states, portions of Tennessee, Virginia, and the Carolinas, and in southern New England, the precipitation was also very heavy, being largely in the form of snow in the last-named district. On the Pacific coast the rainfall was below the average in Oregon, and above the average in California and Washington; at Portland, Oregon, only about 45 per cent. of the average amount fell, while at San Diego, Cal., it was about double the average.

SNOW.

Only the dates of snow in Southern States are given, which are as follows:

Arkansas.—Fort Smith, 6th, 20th; Little Rock, 6th.

Mississippi.—University, 6th.

North Carolina.—Wash Woods, 14th, 22d.

Texas.—Abilene, 6th, 20th; Fort Davis, 13th; Fort Elliott, 5th, 21st, 26th, 27th.

MONTHLY SNOWFALLS (in inches and tenths).

Monthly snowfalls of March generally ranged from 5 to 12 inches in Dakota and Nebraska, and thence eastward to the Atlantic coast, except northern Michigan, portions of New York, and in New England, where the fall was much greater. At Albany, N. Y., slightly more than 50 inches fell, and over a large part of New England the total monthly snowfalls ranged from 30 to 40 inches. In eastern Pennsylvania, northern New Jersey, and in portions of West Virginia the monthly snowfalls ranged from 20 to 30 inches. East of the Mississippi River, to the south of the thirty-fifth parallel, no appreciable amount of snow fell, and to the west of the Mississippi, none fell to the south of the parallel mentioned, except in mountain regions.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches and tenths.*]

At the close of March there was no unmelted snow on the ground, except in northern districts. In Montana, Dakota, Minnesota, and northern Iowa the depth ranged from 1 to 10. In the northern portions of Michigan and Wisconsin depths ranging from 10 to 36 are reported. In Pennsylvania there was none in the southern part of the state and from 6 to 18 in the northern part. In some portions of New York, Vermont, New Hampshire, and Maine there were from 20 to 37 of snow on the ground at the end of the month, while in other portions there was very little.

SLEET.

During March there were but few days on which sleet did not occur in some part of the country, viz., the 6th, 7th, 15th, and 16th. From the 24th to 26th severe sleet storms occurred in Illinois, Indiana, Iowa, Nebraska, and Wisconsin, concerning which these reports are given:

Springfield, Ill.: during the storm on the 24th all electric wires were heavily coated with ice, and many were broken, causing serious interruption to telegraphic communication.

Charleston, Coles Co., Ill.: the sleet storm during the night of the 24–25th damaged fruit trees to a considerable extent in this county.

Crete, Saline Co., Nebr.: the sleet storm of the 25th was the severest known for many years; much damage was done to orchards and shade trees.

Vevay, Switzerland Co., Ind.: the sleet storm of the 24–25th covered all exposed objects with a heavy coat of ice, and many trees were broken.

Dana, Vermillion Co., Ind.: the severest sleet storm of the year occurred on the 26th; trees of all kinds were injured, the smaller fruit trees sustaining the greatest damage.

PRECIPITATION FROM A CLOUDLESS SKY.

Columbus, Ohio: snow fell from a clear sky from 9.10 to 9.25 p. m. on the 11th.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for March, 1888; (4) the departures of the current month from the average;

(5) and the extreme monthly precipitation for March during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of March.	(2) Length of record.	(3) Total for March, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for March.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	3.71	6	3.95	+0.24	4.87	1866	2.84	1887
California.									
Sacramento	Sacramento	2.42	22	3.80	+1.38	7.63	1884	0.09	1885
Salinas	Monterey	2.13	16	3.28	+1.15	5.09	1884	0.19	1885
Florida.									
Merritt's Island	Brevard	2.96	11	1.46	−1.50	7.92	1878	0.76	1882
Illinois.									
Golconda	Pope	3.28	10	6.59	+3.31				
Peoria	Peoria	2.66	32	4.03	+1.37				
Riley	McHenry	2.52	27	2.34	−0.18				
Indiana.									
Blue Lick	Clark	3.08	11	5.41	+2.33	5.41	1888	1.02	1885
Logansport	Cass	2.98	33	3.08	+0.10	5.82	1869		
Spiceland	Henry	3.90	28	3.76	−0.14	7.40	1876	0.70	1885
Vevay	Switzerland	3.89	21	4.23	+0.34	6.30	1882	1.04	1872
Iowa.									
Cresco	Howard	1.81	15	4.55	+2.74				
Kansas.									
Lawrence	Douglas	2.14	20	5.47	+3.33	5.47	1888	0.37	1879
Wellington	Sumner	1.24	10	1.24	0.00	2.73	1881	0.00	1879
Louisiana.									
Point Pleasant	Tensas	4.71	8	6.40	+1.69				
Grand Coteau	Saint Landry	5.91	6	5.92	+0.01				
Maine.									
Gardiner	Kennebec	3.97	50	5.09	+1.12	10.06	1859	0.90	1856
Maryland.									
Cumberland	Alleghany	2.89	16	3.15	+0.26	4.50	1882	1.30	1885
Massachusetts.									
Somerset	Bristol	4.59	18	6.49	+1.90				
Worcester	Worcester	3.55	49	8.37	+4.82				
Nevada.									
Carson City	Ormsby	1.51	9	0.54	−0.97	4.22	1882	0.23	1867
Michigan.									
Thornville	Lapeer	2.54	12	2.12	−0.42				
Kalamazoo	Kalamazoo	2.72	13	2.22	−0.50				
New Jersey.									
Moorestown	Burlington	3.48	25	5.39	+1.91	5.78	1875	1.08	1885
South Orange	Essex	3.94	18	8.20	+4.26	8.20	1888	0.81	1885
New York.									
Palermo	Oswego	2.80	35	1.89	−0.91	6.00	1873	0.68	1885
Ohio.									
Wauseon	Fulton	2.89	15	3.64	+0.75	6.52	1876	0.62	1885
Oregon.									
Albany	Linn	3.89	9	3.34	−0.55				
Pennsylvania.									
Dyberry	Wayne	3.12	29	4.01	+0.89	5.78	1871	1.03	1885
South Carolina.									
Kirkwood	Kershaw	3.27	22	6.83	+3.56				
Stateburg	Sumter	3.91	8	5.90	+1.99	5.90	1888	0.97	1887
Tennessee.									
Milan	Gibson	3.96	6	5.28	+1.32	5.28	1888	1.94	1885
Texas.									
New Ulm	Austin	4.92	16	2.72	−3.20	13.13	1882	1.27	1886
Vermont.									
Strafford	Orange	3.44	14	4.60	+1.16	7.10	1876	1.35	1878
Virginia.									
Bird's Nest	Northampton	4.59	19	8.55	+3.96	8.75	1884	1.70	1883
Wytheville	Wythe	3.04	23	2.73	−0.91	8.00	1884	1.50	1879, 1885
West Virginia.									
Helvetia	Randolph	4.65	12	4.38	−0.27				

EXCESSIVE PRECIPITATION.

Table showing for the month of March monthly rainfalls of 10 inches, or more; rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time	Amt.
Alabama.		*Inches.*			*Inches*			h. m.	*Inches*
Carlowville	1874	12.81	1874	15–18	10.46				
Carrollton	1888	10.47							
Mobile	1872	12.76	1871	11	3.87				
Do	1874	10.57	1872	24	6.46				
Do	1881	10.41	1874	15	4.51				
Do	1884	11.53	1875	11	2.53				
Do	1886	14.62	1876	19	2.95				
Do			1876	27	2.61				
Do			1877	1	3.23				
Do			1879	21	4.20				
Do			1880	9	3.49				
Do			1881	11	4.11				
Do			1882	26	3.78				
Do			1884	18	3.52				
Do			1886	30	3.93				
Montgomery	1874	10.66							
Do	1875	11.56	1874	15	2.72				

Table showing for the month of March, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Alabama—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Montgomery			1874	16	4.67				
Do			1876	15	2.68				
Do			1884	23	3.05				
Do			1886	22	2.57				
Do	1888	11.51	1888	26–27	7.24				
Auburn	1888	11.24	1888	27	4.84				
Newmarket	1888	10.75	1888	25–26	3.12				
Tuscumbia	1888	10.58	1888	25	3.46				
Union Springs	1888	13.48	1888	27	6.20				
Livingston	1888	10.99							
Talladega	1888	12.08	1888	24–27	9.15				
Greensborough	1888	11.20							
Troy	1888	12.50	1888	27	4.50				
Mount Vernon	1888	11.67	1888	27	3.90				
Valley Head			1888	26	3.65				
Florence			1888	26	2.60				
Gadsden			1888	27	4.80				
Arkansas.									
Little Rock			1880	2–3	2.70				
Mount Ida			1880	11	3.20				
California.									
Los Angeles	1884	12.36	1884	3–4	3.18				
Do			1884	6–7	2.67				
Sacramento			1884	9	2.94				
San Francisco			1879	4–5	3.31				
San Gorgonio			1876	4	3.01				
Connecticut.									
New Haven	1876	10.15	1876	25–26	4.78				
Do	1881	10.42	1877	26–27	2.75				
Do			1881	9–10	2.98				
Do			1888	12	2.80				
New London	1877	10.96	1876	25	3.03				
Do			1876	26	3.89				
Do			1881	9–10	3.09				
Middletown			1888		3.07				
District of Columbia.									
Washington City			1878	12	2.60				
Florida.									
Archer	1880	12.33							
Barrancas, Fort	1878	10.75							
Do			1878	10	3.25				
Do			1878	11	3.18				
Do			1878	27	2.80				
Do			1879	19	3.65				
Do			1880	14	2.84				
Saint Marks			1878	28	4.95				
Biscayne						1874	28	0 30	4.10
Cedar Keys	1886	12.14	1882	1	2.38	1882	1	1 40	2.38
Fernandina	1864	12.08							
Jacksonville			1873	28–29	2.56				
Do			1885	21–22	2.58				
Key West						1877	3	1 10	1.20
Pensacola	1880	13.37	1884	13	3.88				
Do			1884	5	3.97				
Do			1886	4	2.60				
Do			1886	26	2.65				
Do			1888	10	4.05	1888	10	1 00	1.22
Georgia.									
Atlanta	1880	11.87	1881	16–17	4.64				
Do	1881	10.96	1881	18–19	3.12				
Do	1886	11.16	1886	29	7.36				
Do			1888	27–28	3.37				
Augusta	1872	10.88	1872	25	4.41				
Do	1875	11.88	1874	15–16	3.00				
Do			1881	16–17	3.45				
Do			1882	27	2.83				
Do			1886	28–29	4.84				
Do			1888	20–21	2.86				
Savannah	1872	10.18	1872	1–2	4.08				
Do			1875	19	2.99				
Forsyth			1880	11	3.10				
Do			1880	19	2.90				
Do	1888	11.50	1888	27	3.11	1888	27	1 00	1.91
Milledgeville	1888	10.81	1888	27	3.10				
Quitman			1888	27	2.55				
Gainesville			1880	9	2.65				
Illinois.									
Cairo			1876	11–12	2.63				
Chicago			1884	25–26	3.26				
Peoria			1859	28	3.29				
Marion			1887	5	4.00				
Indiana.									
Marengo	1888	11.05							
Huntingburg	1888	10.40							
Dana			1888	25	3.25				
Iowa.									
Dubuque			1886	20–21	2.67				
Kansas.									
Ellinwood			1876	5–6	3.14				
Hays, Fort	1876	14.44	1876	15	2.56				
Do			1876	19	4.70				
Leavenworth						1865	20	5 00	6.00
Morse			1888	24	3.50				
Kentucky.									
Blandville			1874	18	3.50				
Louisiana.									
New Orleans	1875	10.84	1872	24–25	4.50				
Do	1876	11.32	1875	11–12	2.75				
Do			1875	29–30	3.81				
Do			1876	19–20	3.98				
Do			1876	27	3.72				

Table showing for the month of March, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Louisiana—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
New Orleans	.....	.....	1877	1	3.02	.....	.....	.....	.....
Do	.....	.....	1878	9	2.73	.....	.....	.....	.....
Do	.....	.....	1880	8–9	3.30	.....	.....	.....	.....
Do	.....	.....	1883	24	2.60	.....	.....	.....	.....
Shreveport	1876	11.67	1876	11	2.81	1876	11	1 00	1.93
Do	.....	.....	1876	19	4.46	.....	.....	.....	.....
Do	.....	.....	1878	8	4.50	.....	.....	.....	.....
Do	.....	.....	1886	26	2.71	.....	.....	.....	.....
Baton Rouge	.....	.....	1878	9	3.50	.....	.....	.....	.....
Clinton	.....	.....	1888	10	3.50	.....	.....	.....	.....
Grand Coteau	.....	.....	1888	26–27	2.74	.....	.....	.....	.....
Donaldsonville	.....	.....	1888	19	2.78	.....	.....	.....	.....
Morgan City	.....	.....	1888	27	3.25	.....	.....	.....	.....
Point Pleasant	.....	.....	1880	10	2.51	.....	.....	.....	.....
Do	.....	.....	1880	11	3.00	.....	.....	.....	.....
Do	.....	.....	1880	14–15	5.01	.....	.....	.....	.....
Vidalia	.....	.....	1888	27	3.25	.....	.....	.....	.....
Maryland.									
Baltimore	.....	.....	1881	9	3.51	.....	.....	.....	.....
Massachusetts.									
Boston	.....	.....	1876	25–26	2.91	.....	.....	.....	.....
Do	.....	.....	1877	26–27	3.04	.....	.....	.....	.....
Do	.....	.....	1881	9–10	2.57	.....	.....	.....	.....
Blue Hill Observatory	.....	.....	1888	13	2.87	.....	.....	.....	.....
Lowell	.....	.....	1886	12–13	3.49	.....	.....	.....	.....
Newburyport	.....	.....	1888	12–13	3.12	.....	.....	.....	.....
Mississippi.									
Brook Haven	1876	11.20	.....	.....	.....	.....	.....	.....	.....
Coleman	1874	16.50	.....	.....	.....	.....	.....	.....	.....
Fayette	1874	11.20	1875	18–19	2.50	.....	.....	.....	.....
Do	.....	.....	1876	6	3.00	.....	.....	.....	.....
Do	.....	.....	1876	14–15	3.10	.....	.....	.....	.....
Do	.....	.....	1881	18	3.00	.....	.....	.....	.....
Jackson	1874	10.08	.....	.....	.....	.....	.....	.....	.....
Do	1875	10.16	.....	.....	.....	.....	.....	.....	.....
Do	1876	10.94	.....	.....	.....	.....	.....	.....	.....
Vicksburg	1875	14.51	.....	.....	.....	.....	.....	.....	.....
Do	1876	11.21	.....	.....	.....	.....	.....	.....	.....
Do	1880	11.23	1880	14–15	4.63	.....	.....	.....	.....
Do	.....	.....	1875	31	3.26	.....	.....	.....	.....
Do	.....	.....	1876	6	2.84	.....	.....	.....	.....
Do	.....	.....	1878	9	4.46	.....	.....	.....	.....
Palo Alto	1888	11.61	.....	.....	.....	.....	.....	.....	.....
West Point	1888	12.22	.....	.....	.....	.....	.....	.....	.....
Starkville	1888	11.15	.....	.....	.....	.....	.....	.....	.....
University	.....	.....	1888	25	3.13	.....	.....	.....	.....
Biloxi	.....	.....	1888	10	4.51	.....	.....	.....	.....
Missouri.									
Saint Louis	.....	.....	1852	12	3.76	.....	.....	.....	.....
Do	.....	.....	1865	29–30	4.90	.....	.....	.....	.....
New Hampshire.									
Hanover	.....	.....	1844	2	2.50	.....	.....	.....	.....
Mount Washington	1877	11.64	.....	.....	.....	.....	.....	.....	.....
Do	1878	10.66	.....	.....	.....	.....	.....	.....	.....
Do	1882	14.52	.....	.....	.....	.....	.....	.....	.....
New Jersey.									
Sandy Hook	1876	11.04	.....	.....	.....	.....	.....	.....	.....
South Orange	.....	.....	1888	11–13	5.00	.....	.....	.....	.....
Bordentown	.....	.....	1888	11–12	3.30	.....	.....	.....	.....
Lambertville	.....	.....	1888	11–12	2.87	.....	.....	.....	.....
Moorestown	.....	.....	1888	11–12	2.84	.....	.....	.....	.....
New Brunswick	.....	.....	1888	11–12	2.66	.....	.....	.....	.....
Somerville	.....	.....	1888	11–12	3.20	.....	.....	.....	.....
New York.									
Oneida	.....	.....	.....	.....	.....	1874	4	1 00	1.04
Do	.....	.....	.....	.....	.....	1874	5	1 00	1.00
New York City	.....	.....	1876	25	3.45	.....	.....	.....	.....
Do	.....	.....	1881	19	2.63	.....	.....	.....	.....
North Carolina.									
Charlotte	.....	.....	1883	25–26	3.40	.....	.....	.....	.....
Hatteras	1877	10.41	1875	15–16	2.50	1875	15	1 30	2.00
Do	1879	12.77	1875	29	3.04	1877	26	1 00	1.39
Do	.....	.....	1877	21–22	5.06	.....	.....	.....	.....
Do	.....	.....	1879	30	6.72	.....	.....	.....	.....
Do	.....	.....	1882	1	3.71	.....	.....	.....	.....
Do	.....	.....	1883	26	3.55	.....	.....	.....	.....
Lenoir	1875	10.20	.....	.....	.....	.....	.....	.....	.....
Murphy	1875	14.10	1875	1	4.20	.....	.....	.....	.....
Portsmouth	1883	10.13	.....	.....	.....	.....	.....	.....	.....
Statesville	1875	14.70	1888	28–29	4.04	.....	.....	.....	.....
Wilmington	.....	.....	1871	30	2.87	.....	.....	.....	.....
Do	.....	.....	1882	27	5.26	.....	.....	.....	.....
Do	.....	.....	1884	25	3.53	.....	.....	.....	.....
Do	.....	.....	1886	31	3.37	.....	.....	.....	.....
Chapel Hill	.....	.....	1888	21	2.62	.....	.....	.....	.....
Ohio.									
Cincinnati	.....	.....	1882	19–20	2.54	.....	.....	.....	.....
Tiffin	.....	.....	1874	14	2.75	.....	.....	.....	.....
Ruggles	.....	.....	1878	12	2.60	.....	.....	.....	.....
Oregon.									
Astoria	1875	16.56	1887	4–5	3.16	.....	.....	.....	.....
Do	1887	16.11	.....	.....	.....	.....	.....	.....	.....
Eola	1877	10.66	.....	.....	.....	.....	.....	.....	.....
Do	1879	10.76	.....	.....	.....	.....	.....	.....	.....
Portland	1873	12.76	.....	.....	.....	.....	.....	.....	.....
Do	1877	11.31	.....	.....	.....	.....	.....	.....	.....
Do	1879	11.70	.....	.....	.....	.....	.....	.....	.....
Stevens, Fort	.....	.....	1879	23–25	8.05	.....	.....	.....	.....
Pennsylvania.									
Philadelphia	.....	.....	1876	24–25	2.72	.....	.....	.....	.....

Table showing for the month of March, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Rhode Island.		*Inches.*			*Inches*			*h. m.*	*Inches*
Bristol	.....	.....	1888	.....	2.88	.....	.....	.....	.....
South Carolina.									
Charleston	.....	.....	1883	25–26	2.52	.....	.....	.....	.....
Hacienda Saluda (Greenville)	1875	11.10	.....	.....	.....	.....	.....	.....	.....
Spartanburg	1875	12.25	.....	.....	.....	.....	.....	.....	.....
Do	.....	.....	1875	2–3	4.90	.....	.....	.....	.....
Do	1888	10.05	.....	.....	.....	.....	.....	.....	.....
Tennessee.									
Chattanooga	1880	12.16	1881	18–19	2.57	.....	.....	.....	.....
Do	1884	10.19	1884	4–5	2.59	.....	.....	.....	.....
Do	1886	12.77	1886	29–30	7.61	.....	.....	.....	.....
Knoxville	1875	13.07	1875	1	2.73	1871	27	0 55	1.01
Do	1884	11.93	1875	14–15	2.64	1875	15	0 49	1.00
Do	1886	11.15	1875	27	2.50	1877	8	0 45	1.00
Do	.....	.....	1884	4–5	2.70	1878	12	0 15	1.08
Do	.....	.....	1886	29–30	5.56	.....	.....	.....	.....
Memphis	1876	11.03	1871	26–27	3.22	.....	.....	.....	.....
Do	.....	.....	1876	23–24	3.35	.....	.....	.....	.....
Do	.....	.....	1880	12	2.75	.....	.....	.....	.....
Do	.....	.....	1882	5–6	3.84	.....	.....	.....	.....
Do	.....	.....	1887	6–7	3.00	.....	.....	.....	.....
Nashville	.....	.....	1875	15	2.55	.....	.....	.....	.....
Do	.....	.....	1880	12	2.79	.....	.....	.....	.....
Do	.....	.....	1882	8–9	3.46	.....	.....	.....	.....
Fostoria	.....	.....	1888	25	3.58	.....	.....	.....	.....
Cookeville	.....	.....	1888	25	3.00	.....	.....	.....	.....
Fayetteville	.....	.....	1888	26	3.23	.....	.....	.....	.....
Watkins	.....	.....	1888	25	2.50	.....	.....	.....	.....
Ashwood	.....	.....	1880	12	2.75	.....	.....	.....	.....
Do	.....	.....	1888	25	3.58	.....	.....	.....	.....
Lawrenceburg	.....	.....	1888	26	4.71	.....	.....	.....	.....
Nunelly	.....	.....	1888	27	4.01	.....	.....	.....	.....
Hohenwald	.....	.....	1888	26	3.52	.....	.....	.....	.....
Savannah'	1888	25	3.22	.....	.....	.....	.....	.....	.....
Florence Station	1887	6	2.85	.....	.....	.....	.....	.....	.....
Austin	1880	12	2.74	.....	.....	.....	.....	.....	.....
Greenville	.....	.....	.....	.....	.....	1885	27	0 15	*2.00
Texas.									
Brownsville	.....	.....	1877	27–28	2.72	.....	.....	.....	.....
Do	.....	.....	1882	24–25	2.83	.....	.....	.....	.....
Clarksville	1874	10.50	1874	14	2.75	1878	27	1 00	1.00
Do	1875	15.50	1875	14	3.25	.....	.....	.....	.....
Do	.....	.....	1875	28	6.00	.....	.....	.....	.....
Do	.....	.....	1876	23	3.00	.....	.....	.....	.....
Galveston	.....	.....	1884	17–18	2.96	1873	13	0 45	2.00
Do	.....	.....	.....	.....	.....	1876	14	1 10	1.26
Rio Grande City	.....	.....	1878	19–20	2.72	.....	.....	.....	.....
Terrell	1875	20.12	1876	5	6.00	1876	5	5 00	6.00
Do	.....	.....	1876	19	4.00	1876	19	1 00	4.00
Do	.....	.....	1876	24	4.00	1876	31	5 00	5.00
Do	.....	.....	1876	31	5.00	.....	.....	.....	.....
New Ulm	.....	.....	1880	21	2.50	.....	.....	.....	.....
Palestine	.....	.....	1888	3–4	5.75	1888	3	1 00	1.47
Kingston Springs	.....	.....	.....	.....	.....	1884	25	0 30	1.60
Melissa	.....	.....	1879	26	3.50	1879	26	3 00	3.50
Utah.									
Mount Carmel	1877	10.00	1874	4	5.00	.....	.....	.....	.....
Vermont.									
Brattleborough	.....	.....	1888	12	4.00	.....	.....	.....	.....
Virginia.									
Cape Henry	1880	10.72	.....	.....	.....	.....	.....	.....	.....
Norfolk	.....	.....	1875	7	2.78	.....	.....	.....	.....
Capeville	.....	.....	1878	12	2.80	.....	.....	.....	.....
Washington.									
Bainbridge Island	1879	13.70	.....	.....	.....	.....	.....	.....	.....
Canby, Fort	1887	14.12	.....	.....	.....	.....	.....	.....	.....
Cathlamet	1875	18.50	.....	.....	.....	.....	.....	.....	.....
Do	1876	13.20	.....	.....	.....	.....	.....	.....	.....
Neah Bay	1879	23.83	.....	.....	.....	.....	.....	.....	.....
Do	1886	12.90	.....	.....	.....	.....	.....	.....	.....
Do	1888	11.37	1888	11–12	4.00	.....	.....	.....	.....
Olympia	1879	14.44	.....	.....	.....	.....	.....	.....	.....
Do	1887	10.60	1888	11–12	2.50	.....	.....	.....	.....
Pysht	1887	12.43	.....	.....	.....	.....	.....	.....	.....
Do	1888	10.55	1888	11–12	4.00	.....	.....	.....	.....
Tatoosh Island	1886	10.89	1887	7–8	3.55	.....	.....	.....	.....
Do	1887	16.36	1887	8–9	3.79	.....	.....	.....	.....
Do	.....	.....	1887	9–10	2.65	.....	.....	.....	.....
Wisconsin.									
Green Bay	.....	.....	1888	1–2	2.80	.....	.....	.....	.....

*Estimated.

With the exception of a few widely separated localities, monthly rainfalls in March of ten, or more, inches in past years have been confined to the following-named portions of the United States: north Pacific coast, Louisiana, and north-eastern Texas, and from Tennessee and western North Carolina southward to the Gulf of Mexico. Mobile, Ala., with a record of eighteen years, shows the maximum number, five having been recorded during the period mentioned, while the shorter records for Atlanta, Ga., Jacksonville, Fla., Vicksburg, Miss., Chattanooga and Knoxville, Tenn., show that they have occurred at those stations with nearly the same frequency

as at Mobile, viz., about once in four years; Shreveport, La., Memphis, Tenn., and Charleston, S. C., with records of fifteen years, or more, show one each.

The sections of country in which daily rainfalls of 2.50, or more, inches have occurred in March are much the same as those for which the largest monthly rainfalls are given. These excessive daily rainfalls are shown to have been most frequent in Tennessee, Alabama, and Mississippi, and, as with the heaviest monthly rainfalls, the records at Mobile, Ala., show the largest number, viz., thirteen for a period of eighteen years. Along the New Jersey and southern New England coasts there have been recorded at a number of stations from one to three daily rainfalls in excess of 2.50 inches. In the Lake region and central valleys they have occurred at very few stations; Saint Louis, Mo., and Fort Hays, Kans., report two each, but no other station in these last-named districts show more than one, and at a majority of stations no such daily rainfalls have occurred. In California there were two at Los Angeles, and one each at San Francisco, Sacramento, and San Gorgonio.

The records for March show but few instances of rainfalls of one inch, or more, per hour, and the stations reporting same are sparsely located. Even in the Gulf States, where the excessive daily and monthly rainfalls have occurred with greatest frequency, there have been very few rainfalls reaching a rate of one inch per hour. The rainfall of 4.10 inches in thirty minutes at Biscayne, Fla., on March 28, 1876, is the heaviest shown by the records.

WINDS.

The most frequent directions of the wind during March, 1888, are shown on chart ii, by arrows flying with the wind. In the Missouri, upper Mississippi, and Ohio valleys, Lake region, New England, the middle Atlantic states, and on the California coast the winds were west, northwest, or north; in the west Gulf states and southern slope, southerly; and in other districts, variable.

HIGH WINDS (in miles per hour).

The maximum velocities of the wind for March, 1888, at Signal Service stations where the movements are registered, are given in the table of miscellaneous meteorological data. Other than the maximum velocities given in the table referred to, the following velocities of fifty, or more, miles per hour have been reported: Fort Canby, Wash., 60, sw., 11th; 56, w., 12th; 56, s., 13th; 63, s., 31st. Eastport, Me., 60, e., 12th. Mackinaw City, Mich., 58, se., 26th. Hatteras, N. C., 55, nw., 11th; 50, w., 22d. Fort Totten, Dak., 52, n., 19th. Block Island, R. I., 50, n., 13th.

LOCAL STORMS.

Sedgwick, Sedgwick Co., Kans.: a local storm, having the characteristics of a tornado, occurred in this vicinity about 5.30 p. m. on the 1st. The storm was accompanied by rain and hail, and destroyed buildings west of here and at Newton, ten miles northeastward.

Another report of the above mentioned storm, received from Halstead, Harvey Co. (lying to the northward of Sedgwick county), states that it also passed through portions of Reno and Kingman counties, its general course being n. 55° e. At one point in the storm's path the soft earth was scooped out to a depth of one foot in a place twenty feet in diameter, and other instances of the violence of the storm are given.

Emporia, Linn Co., Kans.: a very heavy rain storm, accompanied by incessant lightning, began at 7 p. m. of the 1st and continued for about an hour. It is reported that the storm had the characteristics of a tornado at a point a few miles west of the city, where considerable damage was done.

San Francisco, Cal.: light and heavy rain, accompanied by small hail, fell alternately during the day of the 4th, and high winds prevailed from 12.55 until 1.55 p. m., reaching a maximum velocity of thirty-six miles per hour. Nearly all vessels in the harbor dragged their anchors during the storm, and many sustained damage from collision, etc. The barges "Victor" and "Hills Ferry," lumber-laden, were sunk; the steamer "Alice Garrett," with thirty-two persons in quarantine, parted her cables during the height of the gale and drifted towards the wharves, damaging her upper works and then capsizing; no lives were lost.

Galveston, Tex.: a light south wind prevailed during the afternoon of the 10th, and at 6.15 p. m. it shifted suddenly to north and attained a velocity of fifty miles per hour at 10.55 p. m.; the high wind continued until in the forenoon of the following day. This was the severest wind storm experienced in this city since March 13, 1883, when a velocity of sixty-one miles per hour was recorded. Trees, chimneys, and telegraph wires were blown down during the storm.

Spring Hill, Montgomery Co., Ga.: during the early morning (about 4 a. m.) of the 21st a tornado passed in an easterly direction through Telfair county causing the destruction of a number of buildings and the loss of several lives in the vicinity of Lumber City. Reports indicate that this was a well-defined tornado, and numerous instances of the violent force of the wind usually accompanying such storms are given. Mr. A. M. Moses, postmaster at Tupper, Montgomery Co., states that articles of merchandise contained in stores that were destroyed at Lumber City were blown distances of ten to twenty miles.

Bobo, Gordon Co., Ga.: at about 11 p. m. of the 20th a tornado passed through this county, to the north of this place, moving in a northeasterly direction, its path ranging in width from one hundred to two hundred yards. It is reported that while in some places everything in the path of the storm was destroyed, in others the storm apparently lifted from the ground, leaving no evidence of its existence for several miles. The storm was accompanied by rain and hail.

Calhoun, Gordon Co., Ga.: at 10.30 p. m. on the 20th a tornado occurred at this place, moving in a direction from southwest to northeast, destroying numerous buildings and causing other damage. At about 11 p. m. on the above date a violent local storm occurred in the vicinity of Austell, Cobb Co.

Mr. W. A. Simpson, postmaster at Stockton, Loudon Co., Tenn., reports the following:

> The track of the destructive storm which occurred about 10 p. m. March 20th was eight or nine miles east of this place. This storm appears to have been the same one that proved so destructive at Calhoun, Ga. It is reported that an empty barrel and a piece of copper-plate were found in the path of the storm in this county, marked "Calhoun, Ga.," supposed to have been carried by the storm from the latter place, more than one hundred miles from Stockton, which appears to have been in the western edge of the storm. There was heavy rain, almost incessant lightning, and a light fall of small hail here, but the wind was only of moderate force. The course of the storm was almost parallel to the trend of our mountain boundaries and valleys. It is probable that after the storm passed Calhoun it struck the southern extremity of the Unaka Mountains; which elevated it, in passing over them, to a considerable altitude, and that it did not descend to the earth until reaching Loudon county. This storm was one of the most violent that has ever occurred in this part of Tennessee; its course was from southwest to northeast, as is usual with storms in this section.

Loudon, Loudon Co., Tenn.: a destructive local storm or tornado, path about one-fourth of a mile in width, passed in an easterly direction, about three miles south of this place, at about 10.30 p. m. (local time) on the 20th. No serious damage was done outside the path of the storm, which was accompanied by small hail.

Trim Belle, Pierce Co., Wis.: at 3 a. m. on the 21st a strong gale began to blow from the west and continued all day from the same direction, subsiding about an hour after sunset. At 10.30 a. m. the wind velocity was estimated at more than fifty miles per hour.

Mr. S. G. Lackey, voluntary observer at Mesquite, Dallas Co., Tex., reports that a severe hail storm occurred in the vicinity of Lancaster, in that county, at about 8.25 p. m. on the 25th, the path of the storm being about half a mile wide and from five to six miles in length. Hail is reported to have fallen in large quantities, killing chickens, rabbits, etc., and breaking large quantities of window glass.

Chattanooga, Tenn.: a severe thunder-storm, moving from southwest to northeast, began at 3.10 a. m. of the 26th; rain fell in torrents for fifty-six minutes, accompanied by thunder and lightning. The observer could not measure the rainfall at the time, but thinks that not less than one inch of rain fell during the fifty-six minutes. The storm caused considerable damage in this city.

Lyons, Wayne Co., N. Y.: at about 2 o'clock a. m. on the 27th a thunder-storm, with hard dashes of rain, passed Lyons. Six miles east of this village it became more severe, and a farmer living a short distance south of Clyde was alarmed by an unusual sound. When he first went out the stars were shining, but in a few minutes a dense black cloud passed directly overhead, and from it there proceeded a loud roaring, it being apparently a tornado that did not reach the surface of the earth.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations, the highest and lowest depths for March 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, March, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	18	29.7	2	19.4	20.3
Arkansas River:						
Fort Smith, Ark	22.0	6	10.4	24	3.5	6.9
Little Rock, Ark	23.0	28	14.0	24	5.3	8.7
Missouri River:						
Omaha, Nebr	18.0	24	10.0	18	6.4	3.6
Leavenw'rth, Kans	20.0	20	13.8	3	7.8	6.0
Mississippi River:						
Saint Paul, Minn*	14.5	.....	.....	.....	.....	.....
La Crosse, Wis*	24.0	.....	.....	.....	.....	.....
Dubuque, Iowa*	16.0	.....	.....	.....	.....	.....
Davenport, Iowa†	15.0	23	7.5	19	5.6	1.9
Keokuk, Iowa	14.0	2, 28, 29	10.5	4	6.6	3.9
Saint Louis, Mo	32.0	28	25.6	3	12.4	13.2
Cairo, Ill	40.0	31	44.2	13	23.3	20.9
Memphis, Tenn	34.0	31	31.0	17	18.2	12.8
Vicksburg, Miss	41.0	31	30.8	1	24.4	6.4
New Orleans, La	13.0	28	11.4	1	8.5	3.9
Ohio River:						
Pittsburg, Pa	22.0	30	14.0	10, 11, 16	4.6	9.4
Cincinnati, Ohio	50.0	31	39.5	7	16.6	22.9
Louisville, Ky	25.0	31	16.0	8	8.1	7.9
Cumberland River:						
Nashville, Tenn	40.0	30	39.2	23, 24	7.7	31.5
Tennessee River:						
Knoxville, Tenn	.....	30	13.3	10	2.0	9.3
Chattanooga, Tenn	33.0	31	27.0	20	4.8	22.2
Monongahela River:						
Pittsburg, Pa	29.0	30	14.0	10, 11, 16	4.6	9.4
Savannah River:						
Augusta, Ga	32.0	30	32.7	19	8.3	24.5
Sacramento River:						
Red Bluff, Cal	.....	5	5.4	1, 28-30	2.4	3.0
Sacramento, Cal	.....	1	17.5	29, 30, 31	15.4	2.1
Willamette River:						
Portland, Oregon	.....	14	5.2	9, 10	2.5	2.7

* River frozen entire month. † 13 days; river frozen from 1st to 16th, both inclusive.

The Mississippi River passed the danger line at Cairo, Ill., during the closing days of the month, and inundated the lowlands in that vicinity to a considerable extent.

The Savannah River at Augusta reached the danger line on the 30th but fell rapidly on the 31st; no serious damage resulted.

ICE IN RIVERS AND HARBORS.

Passamaquoddy Bay.—Eastport, Me.: floating ice in bay, 11th, 15th, 16th.

Casco Bay.—Portland, Me.: the harbor was full of drift ice on the 13th, causing suspension of navigation; there was also drift ice in harbor on the 14th and 15th; the harbor was free from ice on the 16th.

Connecticut River.—New Haven.: reports from Hartford on the 30th stated that the first boat of the season from Long Island Sound arrived on that date.

Hudson River.—Albany, N. Y.: ice began to break up on 31st.

Wynants Kill River.—Albany, N. Y.: ice broke up and moved out of river on 21st; two dams were carried away, entailing a loss of several thousand dollars.

North and East rivers.—New York City: floating ice in both rivers 5th, 6th, 14th to 18th. East River froze over on 13th.

Alleghany and Monongahela rivers.—Pittsburg, Pa.: floating ice in the Alleghany on 1st, 5th to 7th, 11th to 16th, 18th, 23d, 24th, 25th; in the Monongahela on 5th.

Sandusky Bay.—Sandusky, Ohio: the bay was clear of ice on the 20th; it froze over on the 23d, and was again clear of ice on the 27th.

Lake Erie.—Buffalo, N. Y.: the ice in the lake broke up on the 28th, and drifted down the Niagara River in large fields on the 29th and 30th.

Maumee River.—Toledo, Ohio: the river was clear of ice on the 16th. The steamer "Pathfinder" cleared for Detroit on the 20th, being the first departure of the season.

Grand River.—Lansing, Mich.: ice moved out of river on 19th; river froze again on 22d, and was clear of ice on 26th.

Grand Haven, Mich.: heavy drift ice in river, 16th, 27th. The river opened on the 10th and was entirely free of ice on 31st.

Saint Clair River.—Port Huron Mich.: steamer "Mary" arrived from Algonac, Mich., on the 10th, when navigation between that place and Port Huron was considered open for the season. There was floating ice on the 1st, 4th, 11th, 12th, 29th.

Black River.—Port Huron, Mich.: the ice in the river disappeared on the 29th.

Lake Michigan.—Milwaukee, Wis.: two propellers were fast in the ice near the harbor entrance from early a. m. on the 24th until 6 p. m. on the 26th. The mild weather of the last week of the month, together with the high winds, cleared the lake of ice to a very great extent, so that no ice was in sight at this station on the 31st.

Mississippi River.—Dubuque, Iowa: ice began to move on the afternoon of 31st.

Davenport, Iowa: ice began to move on the 18th and by morning of the 19th the river was free of ice; floating ice was observed on the afternoon of the latter date, and from the 20th to 24th.

Muscatine, Muscatine Co., Iowa: ice moved out of river during the 15th and 16th.

Keokuk, Iowa: the ice dam in the river broke during a. m. of the 2d. The packet "Patience" began making regular trips between Keokuk and Warsaw, Ill., on the 7th. Steamers "Sidney" and "War Eagle" arrived on the 15th from Saint Louis, being the first arrivals from that place this season. Floating ice in river, 9th and 22d.

Little Sioux River.—Smithland, Woodbury Co., Iowa: the ice moved out of the river on the 19th.

Maquoketa River.—Monticello, Jones Co., Iowa: the ice moved out of the river on the 16th.

Cedar River.—Vinton, Benton Co., Iowa: the ice moved out of river on the 18th.

Missouri River.—Fort Sully, Dak.: ice began to disappear rapidly on 14th; river free of ice on the 30th.

Yankton, Dak.: the ice in river began to break up and move out at 9 a. m. on 19th.

Omaha, Nebr.: ice broke during the night and moved down the stream on the 16th.

Leavenworth, Kans.: floating ice in river, 3d, 6th.

Yellowstone River.—Billings, Mont.: ice broke up on 19th; considerable damage resulted from the ice gorges.

Little and Big Horn rivers.—Fort Custer, Mont.: the ice in Little Horn River broke on the 16th, and in the Big Horn on the 19th.

Platte and Laramier ivers.—Fort Laramie, Wyo.: both rivers were free of ice on the 13th.

FLOODS.

Palestine, Tex.: an unusually heavy rain fell on the 3d, causing considerable damage to railroads in this part of state.

Onancock, Accomac Co., Va.: the high tide during the severe storm on the 11th inundated a very large area along Chesapeake Bay, drowning cattle and causing other damage.

Wilmington, N. C.: slight freshet occurred in the Cape Fear River on the 15th.

Fremont, Dodge Co., Nebr., 19th: the freshet in the Platte River has caused great damage in this county. A bridge at this place, and a part of one at North Bend, were washed away, as also several bridges over the smaller streams.

Fort Buford, Dak.: the river rose five feet during the 20th, and overflowed in some places; on the 23d the river fell slightly, but afterwards rose again, flooding portions of the adjacent bottom lands; the Saint Paul, Minneapolis, and Manitoba road-bed was washed to some extent. Reports from the Yellowstone Valley on the 24th stated that ice-dams had formed in the river, causing it to overflow in some places.

Poplar River, Mont.: on the 20th the ice in the Missouri River at Rocky Point and Galpin broke, but at Poplar River it remained intact, causing the water up the river to overflow adjacent bottom lands; the railroad track west of Poplar River was submerged, and houses at the base of the hill were rendered uninhabitable. Reports on the 21st stated that bridges and the railroad bed were washed out to the west of Poplar River. On this date the water reached the highest stage that has occurred since 1881.

Albany, N. Y.: on account of the warm weather and heavy rain which prevailed on the 21st, the snow melted rapidly, and caused rivers and small streams to rise suddenly. At 6 p. m. the docks in this city were submerged, and at 9 a. m. on the following day the river reached its highest stage; after that time it fell slowly. The high water in the Mohawk River and Schoharie Creek delayed all trains on the West Shore and New York Central railroads on this date. The docks were again submerged on the 29th; much damage was done by the high water.

New Haven, Conn., 22d: freshets are reported throughout the state. At Willimantic, Windham Co., a dam broke, causing the mills at that place to shut down. At Hartford the river was sixteen feet above low-water mark, with the ice still firm on the 23d. In other sections of the state the waters began to subside on the latter date.

Norwich, New London Co., Conn., 22d: the recent thaw, together with heavy rains, caused the streams in the surrounding country to overflow, washing away bridges, etc. An area of ten acres in the centre of Norwich was inundated, the water reaching a depth of four feet.

Palmer, Hampden Co., Mass.: the heavy rains which prevailed throughout western Massachusetts on the 21st inundated meadows for miles, and caused much damage to roadways. The lowlands along the Naugatuck and Housatonic rivers in the vicinity of Ansonia were also submerged.

Nashville, Tenn.: the Cumberland River rose very rapidly from the 25th to 30th, and by 11 a m. of the latter date had reached a height of 39.2 feet. About fifty families living on lowlands near the river were compelled to move.

Rockwood, Roane Co., Tenn.: the heavy rainfall during the night of the 26–27th flooded a part of this town; the foundations of some buildings were weakened.

Cairo, Ill.: the Mississippi and Ohio rivers rose rapidly from the 27th to the end of the month, reaching their highest stages on the 31st. On the 29th the lowlands both above and below Cairo were inundated. Large quantities of floating débris passed down both rivers on the above dates, interrupting navigation.

Augusta, Ga.: the Savannah River began to rise rapidly on the 27th, and continued to rise until 1.30 p. m. on the 30th, when it reached its highest point, 32.7 feet; it remained at that stage until 9 p. m., when it began to fall; no damage of any consequence resulted.

Rockland, Knox Co., Me., 27th: recent freshets have caused great damage to bridges and mill property in the upper part of this county.

Findlay, Hancock Co., Ohio: Blanchard's Fork of the Auglaize River, which runs through this town, overflowed on the 27th, causing much damage. People living in the lowlands were compelled to move.

Decatur, Morgan Co., Ala.: the Tennessee River below this place overflowed on the 28th. Numerous washouts occurred on the Louisville and Nashville Railroad, between Decatur and Birmingham.

Selma, Dallas Co., Ala.: the Alabama River overflowed at this point on the 28th, causing the people living along the river to move to adjacent highlands.

Anniston, Calhoun Co., Ala., 28th: the heavy rains of the past four days have caused the streams in this section of the state to overflow, washing away many bridges. Travel over the East Tennessee, Virginia & Georgia, the Georgia Pacific, and the Anniston & Atlantic railways was entirely suspended.

Des Moines, Iowa: reports from Sioux City on the 28th stated that on account of the high water at the mouth of the Big Sioux River many persons were compelled to leave their homes.

Lima, Allen Co., Ohio: the Ottowa River, which flows through the centre of this town, overflowed on the 28th, carrying away fences, oil-derricks, pump-houses, etc., along its banks, and damaging about twenty dwellings in the lowlands. The damage is estimated at several thousand dollars. Lost Creek, in the eastern part of Allen county, reached the highest stage known in many years.

Statesville, Iredell Co., N. C.: destructive freshets occurred at this place on the 29th.

Tiffin, Seneca Co., Ohio, 29th: the continuous rains of the past twenty-four hours have caused the Sandusky River and its tributaries to overflow, inundating thousands of acres, including a part of Tiffin. Winter wheat has been greatly injured by the freshet.

The observer at Milledgeville, Baldwin Co., Ga., reports as follows: The month has been very wet and unfavorable to farming interests. The rolling lands of middle Georgia have never before been more damaged in so short a time as was done by the heavy rainfall during the last week of this month. The first three months of the year have afforded but little weather for farm work, which is much delayed.

HIGH TIDES.

Hatteras, N. C., 11th; Pensacola, Fla., 19th; Eastport, Me., 29th.

LOW TIDES.

Baltimore, Md., 12th to 15th; Sebastian, Fla., 26th, 27th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The principal auroral displays of the month were those of the 7th and 15th, both of which were observed quite generally from Montana and Dakota eastward to New England; Egg

Harbor City, N. J., being the southernmost point reporting on the 7th, and stations in northern Ohio being the most southerly reporting the display of the 15th.

Auroras were observed during the month, as follows: 2d, Northfield, Vt. 7th, Kimball, Dak.; Cresco, Iowa; Cambridge (aurora suspected) and Provincetown, Mass.; Grand Haven, Marquette, and Traverse City, Mich.; Moorhead and Saint Vincent, Minn.; Egg Harbor City, N. J.; Delavan and Madison, Wis. 8th, Provincetown, Mass.; Fort Assinaboine, Mont. 9th, Bismarck, Dak. 10th, Egg Harbor City, N. J. 12th, Fort Assinaboine, Mont. 15th, Bismarck, Fort Buford, and Webster, Dak.; Cresco, Iowa; Eastport and Gardiner, Me.; Cambridge and Newburyport (suspected) and Provincetown, Mass.; Moorhead and Saint Vincent, Minn.; Poplar River, Mont.; Lordstown and Wauseon, Ohio; Delavan, Deuster, Embarras, and Madison, Wis. 16th, Bismarck, Fort Buford, and Webster, Dak.; Fort Assinaboine, Mont. 17th, Gardiner and Orono, Me.; Alpena, Mich.; Berlin Mills and Nashua, N. H.; Rose, N. Y. 18th, Huron, Dak.; Gardiner and Orono, Me.; Westborough, Mass. 21st, Webster, Dak.; Saint Vincent, Minn. 23d, Cornish, Me. 24th, Manson, Iowa. 30th, Fort Buford and Fort Totten, Dak.; Saint Vincent, Minn.; Poplar River, Mont.; Quakertown, Pa.

The following are descriptions of some of the most brilliant displays of the month:

Marquette, Mich.: an auroral arch, of pale white light, was observed at 8.20 p. m., 7th, covering about 90° of the horizon and reaching an altitude of 15°. At 10.40 p. m. several streamers were observed shooting upward to an altitude of 65°. Curtains of light, having a silvery appearance, moved laterally from east to west. The display, which was very brilliant, terminated at midnight.

Saint Vincent, Minn.: an aurora began at 9.20 p. m., 15th, and ended during the night; it first consisted of an arch which, at 10 p. m., divided into two arches, one about 4° above the other, the upper one having an altitude of 12° and covering 105° of the horizon. Maximum brilliancy occurred at 10.30 p. m.

Moorhead, Minn.: a very brilliant aurora, consisting of two arches, was observed at 10 p. m., 15th; the distance between the two arches was about 8° or 10°, the upper one extending to within 20° of the zenith; the display ended at 5 a. m. on the 16th.

Bismarck, Dak.: an auroral arch, of a bright yellow color, was first observed at 10 p. m. on the 15th; the display increased in brilliancy and extent until its maximum was attained at 11 p. m.; the arch rested upon a dark segment 10° high, covered 80° of the horizon, and reached an altitude of 40°; the display faded away gradually and had entirely disappeared by midnight. At 12.45 a. m. of the 17th an auroral light, partially obscured by cirro-stratus clouds, and consisting of a well-defined arch of pale yellow color, was observed; the arch rested on a dark segment 10° high, and covered 120° of the horizon, from which beams of light extended upward to an altitude of 40°; the aurora attained its maximum intensity at 3 a. m. and ended at 4.30 a. m.

THUNDER-STORMS.

Thunder-storms were reported as follows: 1st, Montrose, Colo.; Parkston and Yankton, Dak.; Fort Reno and Fort Supply, Ind. T.; Auburn, Ames, Bancroft, Cromwell, Clarinda, Des Moines, Glenwood, Panora, Smithland, and Wesley, Iowa; Emporia, Independence, Lebo, Manhattan, Topeka, Salina, Wakefield, Wellington, and Wilson, Kans.; Conception, Mo.; Brownville, Crete, De Soto, and Omaha, Nebr.; Corsicana, Decatur, New Ulm, and Palestine, Tex. 2d, Eureka Springs, Ark.; Oroville, Cal.; Fort Sill, Ind. T.; Lamar, Mo.; Abilene, Corsicana, Cedar Hill, and Cleburne, Tex. 3d, Montrose, Colo.; Fort Sill, Ind. T.; Philipsburg, Pa.; Brownsville, Cleburne, Corsicana, Decatur, and Fort Elliott, Tex. 4th, Angel Island, Alcatraz Island, Salinas, and San Francisco, Cal.; Montrose, Colo.; Liberty Hill and Shreveport, La.; Vicksburg, Miss.; Decatur, Galveston, and Palestine, Tex. 5th, Montrose, Colo.; Pensacola, Fla.; Shreveport, La. 6th, Montrose, Colo.; Sebastian and Jupiter, Fla. 8th, Fort Apache and Fort McDowell, Ariz.; Willows, Cal.; Conception, Mo. 9th, Fort Smith, Hot Springs, Lead Hill, and Little Rock, Ark.; Montrose, Colo.; Fort Sill, Ind. T.; Clarinda and Des Moines, Iowa; Globe, Independence, Lebo, Manhattan, Topeka, and Wellington, Kans.; Shreveport, La.; Lamar and Springfield, Mo.; Corsicana, Decatur, and Palestine, Tex. 10th, Livingston and Mobile, Ala.; Tallahassee and Pensacola, Fla.; Cairo and Windsor, Ill.; New Providence, Ind.; Grand Coteau, Liberty Hill, and Shreveport, La.; Biloxi, Miss.; Springfield, Mo.; Milan and Memphis, Tenn. 11th, Auburn, Ala. 13th, Brownsville, Corpus Christi, Rio Grande City, and San Antonio, Tex. 14th, Brownsville, Tex. 16th. Fort Apache and Fort Bowie, Ariz.; Charleston, Ill.; Cedar Springs, S. C. 17th, Fort Apache, Fort Thomas, Willcox, and Tucson, Ariz.; Charlotte, Lenoir, and Statesville, N. C.; Columbia and Stateburg, S. C.; Fort Davis, Tex.; 18th, Auburn, Bancroft, Clarinda, Clear Lake, Cresco, Cromwell, Glenwood, Manson, Osage, Sac City, Smithland, and Wesley, Iowa; Tribune, Kans.; Portland, Me.; Traverse City, Mich.; De Soto, Genoa, Marquette, and Omaha, Nebr.; Lava, N. Mex.; Brownsville, Corsicana, Corpus Christi, New Ulm, Palestine, and San Antonio, Tex.; Manitowoc, Wis. 19th, Fort Apache and Fort McDowell, Ariz.; Eureka Springs, Fort Smith, Hot Springs, and Little Rock, Ark.; Montrose, Colo.; Ames and Glenwood, Iowa; Independence, Kans.; Grand Coteau, La.; Alpena, Mich.; Lamar and Springfield, Mo.; Cedar Springs, S. C.; Milan, Tenn.; Brownsville, Corpus Christi, and Galveston, Tex. 20th, Auburn, Livingston, Mobile, Montgomery, and New Market, Ala.; Pensacola, Fla.; Forsyth and Quitman, Ga.; Cairo, Ill.; Butlerville, Jeffersonville, Limona, Mauzy, Sunman, and Vevay, Ind.; Lexington and Louisville, Ky.; Grand Coteau, La.; Biloxi, Miss.; Egg Harbor City, N. J.; Cleveland, Columbus, North Lewisburg, Portsmouth, Westerville, and Yellow Springs, Ohio; Aiken and Stateburg, S. C.; Chattanooga, Knoxville, Memphis, Milan, and Nashville, Tenn.; Comfort and Corsicana, Tex.; Marion, Va. 21st, Mount Vernon, Ala.; Washington City; Alva, Limona, and Tallahassee, Fla.; Atlanta, Augusta, Forsyth, and Milledgeville, Ga.; Baltimore, Emmitsburg and Woodstock, Md.; Beverly, Clayton, and Moorestown, N. J.; Lenoir, N. C.; College Hill; Garrettsville, Lordstown, and Tiffin, Ohio; Catawissa, Philadelphia, Pittsburg, Quakertown, and Westtown, Pa.; Columbia and Stateburg, S. C.; Knoxville, Tenn.; Bird's Nest, Cape Henry, Norfolk, and Variety Mills, Va.; Parkersburg, W. Va. 22d, Ardenia, N. Y. 23d, Fort Bidwell, Cal. 24th, Fort Smith and Hot Springs, Ark.; Fort Sill and Fort Reno, Ind. T.; Globe, Manhattan, Salina, Wakefield, Wellington, and Wilson, Kans.; Grand Coteau, Liberty Hill, and Shreveport, La. 25th, New Market, Ala.; Fort Smith, Hot Springs, Lead Hill, and Little Rock, Ark.; Montrose, Colo.; Amana, Cedar Rapids, Fort Madison, Keokuk, Muscatine, and Vinton, Iowa; Liberty Hill, New Orleans, and Shreveport, La.; University and Vicksburg, Miss.; Frankford, Lamar, and Springfield, Mo.; Gallinas Spring, N. Mex.; Ashwood, Milan, and Nashville, Tenn. 26th, Montgomery, Mount Vernon, and New Market, Ala.; East Pasadina, Cal.; Las Animas and Montrose, Colo.; Pensacola, Fla.; Quitman, Ga.; Pekin, Ill.; Cedar Rapids and Oskaloosa, Iowa; Grand Coteau, New Orleans, and Shreveport, La.; Biloxi, Miss.; New Athens and Portsmouth, Ohio; Chattanooga and Nashville, Tenn.; Galveston, Tex. 27th, Montgomery, Ala.; Jeffersonville, Ind.; Grand Coteau and Shreveport, La.; University, Miss.; Auburn, Rose, and Syracuse, N. Y.; Nashville, Tenn.; Galveston, Tex. 28th, Atlanta, Forsyth, and Milledgeville, Ga.; Jeffersonville and Sunman, Ind.; Charlotte and Statesville, N. C.; Cedar Springs, Columbia, Stateburg, S. C.; Ashwood and Nashville, Tenn.; Dale Enterprise, Va.; Middlebrook, W. Va. 29th, Forsyth, Ga. 31st, Bandon, Oregon.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Key West, Fla., 4th: but 0.88 inch of rain has fallen since the 27th of December last; all cisterns are extremely low and many completely empty; families living on the outskirts of the city are depending on supplies brought from the large Government cistern at Fort Taylor; water is carted around in the streets and sold. Quite a heavy rain fell on the 11th, breaking the drought and replenishing the water supply to a limited extent.

FOREST AND PRAIRIE FIRES.

Forest and prarie fires were reported as follows: Fort Sill, Ind. T., 2d to 17th, 20th to 30th; Tribune, Kans., 8th, 12th to to 14th; Cedar Springs, S. C., 13th; Fort Reno, Indian T., 9th, 13th, 17th, 30th; Las Animas, Colo., 14th; Fort Bidwell, Cal., 29th; Pike's Peak, Colo., on the 31st, extensive prairie fires were observed to the southeastward of Colorado Springs.

HALOS.

Solar halos were recorded on every day during the month in some part of the country; they were least frequent on the 4th, 8th, 9th, 13th, 14th, and 26th; and most frequent on the 10th, 15th, 19th, 23d, and 24th; they were observed on from ten to fifteen dates in the following states, and territories: Dakota (maximum), Florida, Iowa, New York, Ohio, Texas, Washington, and Wisconsin.

Only a few lunar halos were recorded from the 1st to the 15th, and on the 30th, and 31st, but during the remainder of the month they were extensively observed, being most frequent on the 23d and 24th; none were reported on the 10th and 13th; they were recorded on the largest number of dates in California and Oregon; in a number of states they were not reported at all.

METEORS.

Meteors were observed, as follows: 1st, Omaha, Nebr. 3d, Mount Vernon, Ala. 6th, Clear Lake, Iowa; Kalamazoo, Mich.; Beverly, N. J. 7th, Wauseon, Ohio; Corry, Pa. 8th, Kalamazoo, Mich., and Wauseon, Ohio. 10th, Clear Lake, Iowa; Tribune, Kans. 13th, Tribune, Kans. 14th, Clear Lake, Iowa. 15th, Auburn, Ala.; Vevay, Ind. 16th, Lead Hill, Ark.; Cedar Keys, Fla. 20th, Yuma, Ariz. 27th and 28th, Clear Lake, Iowa. 30th, Parkston, Dak. 31st, Wilson, Kans.

MIRAGE.

Moorhead, Minn.: villages, hills, timber, and lakes situated to the northeast, east, and southeast of station, and ordinarily not visible from this place, were distinctly seen at 3 p. m. on the 22d.

Fort Assinaboine, Mont.: the banks of Milk River, situated about ten miles northeast of this place, were plainly visible nearly all day on the 15th; objects appeared to be elevated about 5° to 6° above the surface of the ground.

Mirages occurred also, as follows: Webster, Dak., 5th; Cedar Hills, Tex., 8th; Marquette, Nebr., 12th to 14th; Tribune, Kans., 12th to 14th, 18th, 20th, 23d; Cedar Keys, Fla., 19th.

SAND STORMS.

Sand storms were reported, as follows: Fresno, Cal., 1st, 30th, 31st; Fort Mojave, Ariz., 7th, 17th, 18th; Yuma, Ariz., 8th; Willcox, Ariz., 8th, 10th, 11th; Pekin, Ill., 21st; Boisé Barracks, Idaho, 31st.

VERIFICATIONS.

INDICATIONS FOR 33 HOURS IN ADVANCE.

The percentages of verifications of the tri-daily indications for March, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for all districts east of the Rocky Mountains for March, 1888, were made by Prof. Cleveland Abbe, except those for Minnesota and Dakota, which were made at Saint Paul, Minn., by 1st Lieutenant Thomas M. Woodruff, 5th Infantry, U. S. Army, Acting Signal Officer; those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Junior Professor C. F. Marvin.

Percentages of indications verified, March, 1888.

States.		States.	
Maine	72.55	Kentucky	77.42
New Hampshire	73.77	Ohio	71.77
Vermont	67.97	West Virginia	79.97
Massachusetts	71.55	Indiana	78.90
Rhode Island	73.84	Illinois	80.26
Connecticut	72.42	Lower Michigan	76.10
Eastern New York	71.90	Upper Michigan	72.42
Western New York	73.13	Wisconsin	73.68
Eastern Pennsylvania	74.48	Minnesota*	67.29
Western Pennsylvania	69.52	Iowa	74.68
New Jersey	77.10	Kansas	76.87
Delaware	73.61	Nebraska	75.94
Maryland	73.94	Missouri	80.52
District of Columbia	72.81	Colorado	76.48
Virginia	75.61	Eastern and Southwestern Dakota*	68.69
North Carolina	76.03	Southern California*	81.84
South Carolina	73.10	Northern California*	78.00
Georgia	73.00	Oregon*	77.55
Eastern Florida	76.68	Washington Territory*	73.74
Western Florida	72.23	*By elements:*	
Alabama	78.26	Weather	81.14
Mississippi	80.29	Wind	74.51
Louisiana	83.77	Temperature	68.50
Texas	75.16		
Arkansas	80.52	General average	75.42
Tennessee	78.26		

* In determining the general average percentage for the different elements, Minnesota, Dakota, and the Pacific coast states have not been included.

CAUTIONARY SIGNALS.

Of the total number of cautionary and storm signals ordered during March, 1888, it was practicable to determine the justification or failure of forty; justified, twenty-five, or 62.50 per cent. Of the above, thirty-eight were ordered for cautionary signals; number justified, twenty-four or 63.16 per cent. Two storm signals were ordered; justified, one or 50.00 per cent. Total number of direction signals ordered, forty-five; justified, thirty-nine, or 86.67 per cent. Number of signals ordered for easterly winds, thirty; justified, twenty-seven, or 90.00 per cent. Number of signals ordered for westerly winds, fifteen; justified, twelve, or 80.00 per cent.

Number of storms without signals forty-two. Number of signals ordered late, *i. e.*, after the justifying velocity had begun, five, or 12.50 per cent.

COLD-WAVE SIGNALS.

Total number of cold-wave signals ordered from Office Chief Signal Officer, two hundred and thirteen; justified, one hundred and fifteen, or 53.99 per cent. Ninety-eight cold-wave signals were ordered during the month by the Signal Service Officer at Saint Paul, Minn., of which, sixty, or 61.22 per cent., were justified.

LOCAL VERIFICATIONS.

The following extracts from the published reports of state weather services for March, 1888, show the percentages of verification of weather and temperature signals for the several states:

Michigan.—Weather and temperature signals are now displayed in one hundred and forty towns in the state, and on the baggage-cars of twenty-six trains on eight principal railroads of the state.

The indications and cold-warnings are issued by the Chief Signal Officer and distributed to the different stations through the central office. The indications are issued at 1 a. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentage of verification of these indications for March is as follows

(the verification is taken from reports of displaymen furnished this office monthly): temperature, 76.1 per cent; weather, 86.6 per cent.; temperature and weather, 81.3 per cent.

The percentage of verification of weather predictions for March on the D., G. H., and M. R'y, is 90.0 for weather, and 75.0 for temperature; on the C. & G. T. R'y, weather, 88.9, temperature, 86.6; P. H. & N. W. R'y, weather, 90.0, temperature, 87.0; M. C. R'y, weather, 88.0, temperature, 87.0; G. R. & I. R'y, weather, 88.1, temperature, 85.0; C. & W. M. R'y, weather, 86.0, temperature, 80.0; P. O. & P. A. R'y, weather, 90.0, temperature, 87.7.

Cold-wave warnings were issued by the Chief Signal Officer on the 2d at 7 p. m., and were followed by a fall of 35° by the morning of the 3d; on the 16th, at 10.30 a. m., and were followed by a fall of 22°.5 by 7 a. m. of the 17th; on the 20th, at 7 a. m., and were followed by a fall of 23° by 10 p. m. of the same date; the warning of the 26th was not justified, and one cold wave passed on the 11th, for which no warning was issued.

Minnesota.—The percentage of verification of weather signals was 78 for weather and 81 for temperature.

Nebraska.—The percentages of correct predictions for the state are as follows: temperature, 88.2; weather, 90.0; mean, 89.1.

Nevada.—The verification of the Signal Service indications at Carson City was 89 per cent. for weather and 70 per cent. for temperature.

South Carolina.—The percentages of verifications of the weather and temperature predictions for the state was: for weather, 87.0; for temperature, 79.0.

Tennessee.—The percentage of verification of the daily weather and temperature predictions issued from the Signal Office at Washington to the various stations were, for the state: weather, 86.8 per cent.; temperature, 79.6 per cent.

STATE WEATHER SERVICES.

The following extracts are republished from reports for March, 1888, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The heavy precipitation on the 26th and 27th damaged property throughout the state to a considerable degree. All railroads were more or less injured and the trains on the trunk lines were stopped for several days. Bridges in many localities were swept away, and numerous manufacturing enterprises were forced to stop until the water subsided. The local wind storms accompanying this rain were quite severe in some places, unroofing houses and destroying fences and trees. Some people were injured, but no one was reported killed. This cyclone lasted for two days and the temperature was high during the entire period. Immediately after this storm it turned off quite cool, but a reaction soon set in and the days became warm and pleasant again. Rains were frequent throughout the month, with occasional thunder-storms. The average rainfall was 2.56 inches above the normal.

Frosts were frequent, and toward the latter part of the month quite damaging to the tender buds. At least two-thirds of the fruit crop has been destroyed, and vegetation generally is very backward. The last frost occurred on the 23d.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 53.8; highest monthly mean, 59.8, at Troy; lowest monthly mean, 47.7, at Gadsden; maximum, 83, at Newton, on 4th; minimum, 16, at Gadsden, on the 23d; range for state, 67; greatest monthly range, 60, at Gadsden; least monthly range, 44, at Livingston and Florence.

Precipitation, including melted snow (in inches).—Average for the state, 9.89; greatest, 13.48, at Union Springs; least, 6.50, at Newton.

Wind.—Prevailing direction, southeast.

The "Arkansas Weather Service;" Prof. John C. Branner, Little Rock, director:

Temperature (in degrees Fahr.).—The mean temperature of the month was decidedly below the average, as shown by the reports from the following points with the number of years of comparison: Little Rock, 3.3 lower than an average of eight years; Lead Hill, 2.9 below six years; Washington, 3.6 below twenty years; Fort Smith, 2.4 below five years; Conway, 10.1; Osceola, 10.6; and Russellville 3.4 lower than last year. The highest temperatures were recorded on the 16th and 31st at nearly every station, and the lowest on the 11th and 12th, with but few exceptions. Frosts were of frequent occurrence during the entire month, the latest being reported on the 28th at Dallas and 29th at Fort Smith, Eureka Springs, and Washington.

Precipitation (in inches).—The rainfall was reported generally in excess to the amount of 4.30 at Helena, 3.55 at Washington, 1.58 at Conway, 1.14 at Fort Smith, 1.03 at Russellville, and less than an inch excess at Lead Hill, Eureka Springs, and Little Rock. Snows on the 5th were reported from Lonoke, Alexander, Lead Hill, Russellville, and Little Rock, and on the 10th, 20th, and 22d at Lead Hill and Eureka Springs, and 19th at Dallas.

The "Colorado Weather Service," Prof. F. H. Loud, Colorado Springs, director:

Summary.

Temperature (in degrees Fahr.).—Mean for state (twenty-one stations reporting), 30.6; highest monthly mean, 41.4, at Grand Junction; lowest monthly mean, 15.0, at Climax; maximum, 79.0, at Fort Morgan, on 31st; minimum —17.0, at Alma, on 26th; greatest monthly range, 39.4, at Pandora; least monthly range, 18.0, at Georgetown.

Precipitation, including melted snow (in inches).—Average for state (fifteen stations reporting), 0.62; greatest, 1.49, at ranch near Como; least, 0.14, at Saguash.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, Springfield, director:

The temperature has been considerably below the average. In the northern division it was 4°.5 below; in the central, 3°.8, and in the southern, 4°.3. In the whole state it was 4°.2 below the average of ten years. Only once in ten years has the monthly mean for March been lower than that of the month ust passed, in 1881, when the mean temperature was 34°.4.

The rainfall in the state during the month was considerably above the average. In the northern division it was 1.11 inches above the average for the previous ten years; in the central division it was 1.06 inches, and in the southern it was 1.29 inches above; while for the whole state it was 1.15 inches above the average for ten years.

The precipitation during January and February of the present year was considerably below the average, but March has supplied the deficiency and brought the rainfall of the three months up to the average.

Heavy rains prevailed through the state on the 25th and 26th, and the following unusually large rainfalls have been reported: 3.13 inches at Jordan's Grove; 2.10 inches at Benton; 2.06 inches at Peoria; 2.00 inches at Pana; 2.00 inches at Wapella; 2.00 inches at Prairieville; 2.00 inches at Flora; 2.00 inches at Mascouta, and 2.00 inches at Three Mile.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

Although the temperature fell less low than in other years, a steady low temperature prevailing caused the mean temperature for the month to be below the normal for March at every station of observation, the deficiency ranging from —0°.2 at Connersville to —6°.3 at Logansport. Abrupt changes in temperature occurred on the 2d, 14th, 15th, 18th, 22d, 26th, 30th, and 31st. The lowest temperature for the month was noted everywhere on the 22d, and the highest at the greatest number of stations on the 19th; except at a few places in the southern portion of the state, the maximum temperature occurred on the 30th or 31st.

Except at Lafayette and Spiceland, the amount of precipitation was at all stations above the normal, the average excess for the state measuring 1.62 inches. It fell mostly in the form of rain, while the amount of snowfall, and the dates on which it fell, were limited.

The general state of the weather during the month has benefited crops and pasturage but little. Vegetation in general at the end of the month, in central and northern portions of the state, is less advanced than usually. Little sunshine, steady cool temperature, thawing during the day and freezing during the night, did not permit vegetation to recover readily.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

Summary.

Temperature (in degrees Fahr.).—Monthly mean for the state, 37°.2; highest monthly mean, 43°, at Independence and Sedan; lowest monthly mean, 32°, at Tribune; absolute maximum, 90°, at Collyer, on the 17th; absolute minimum, —9, at McAllister, on the 5th; range for state, 99°; greatest monthly range, 91°, at McAllister; least monthly range, 58°, at Rome; greatest daily range, 55°, at Collyer, on the 17th; least daily range, 2°, at Independence on the 24th, and at Tribune on the 25th.

Precipitation, including melted snow (in inches).—Average for the state, 2.00; greatest, 5.47, at Lawrence; least, 0.30, at Collyer and Winona.

Wind.—Prevailing direction, south.

The "Louisiana State Weather Service," in charge of R. E. Kerkam, Sergeant, Signal Corps, at New Orleans:

Temperature (in degrees Fahr.).—The highest temperature, 86, occurred at Liberty Hill on 31st; the lowest, 24, at Clinton on the 12th; monthly range of temperature 62.

Precipitation (in inches).—The precipitation for the month was about 1.50 in excess of the normal in all parts of the state. The heaviest rains reported are as follows: Natchitoches, 2.30, on the 9th; Vidalia, 3.25, on the 27th; Clinton, 3.50, on the 10th; Baton Rouge, 2.05, on the 19th; Grand Coteau, 2.74, on the 27th; Donaldsonville, 2.78, on the 19th; Saint Martinsville, 2.04, on the 10th; New Orleans, 2.02, on the 26th; Morgan City, 3.25, on the 27th.

Wind.—The prevailing direction of the wind was from the north.

The "Michigan Weather Service," N. B. Conger, Sergeant, Signal Corps, Lansing, director:

Temperature (in degrees Fahr.).—The temperature was below the normal in all sections during March. The greatest departure from the normal was in the upper peninsula, where it reached 9.1; the least in the central section,

where it reached 1°.3 below the normal. The highest temperature during the month, 73, occurred at Bell Branch on the 19th; the lowest —32, at Lathrop, on the 23d. The highest mean daily temperature for the month, 49, occurred on the 19th, when it was 20 above the normal, and the lowest, 6, occurred on the 22d, when it was 22 below the normal. Twenty-two stations report a minimum temperature of —10, or lower, during the month; this low temperature occurred on the night of the 22d or morning of the 23d; the temperature reached the maximum on the 19th, and began to fall on the evening of the 20th; continued until the minimum was reached on the 23d.

Precipitation, including melted snow (in inches).—The average amount of precipitation for March, 2.72, is 0.22 above the normal of thirteen years. The precipitation was above the normal in all sections, from 1.80 in the upper peninsula to 0.09 in the central section. Comparing the average precipitation of this month with the records of the past twelve years, it is found that the greatest average precipitation, 3.64, occurred in 1882; the least, 1.35, in 1887.

Summary.

Temperature (in degrees Fahr.).—Highest monthly mean, 30.6, at Colon and Williamston; lowest monthly mean, 12.1, at Lathrop; absolute maximum, 73, at Bell Branch, on the 19th; absolute minimum, —32, at Lathrop, on the 23d; range for the state, 105; greatest monthly range, 80°, at Fletcher and Lathrop; least monthly range, 49, at North Marshall; greatest daily range, 54, at Snowflake, on the 25th; least daily range, 2.9, on the 1st, at Saint Louis.

Precipitation, including melted snow (in inches).—Average for the state, 2.72; greatest, 6.10, at Sault Ste. Marie; least, 1.00, at Mackinaw City.

Wind.—Prevailing direction, northwest.

The "Minnesota Weather Service," Prof. W. W. Payne, Northfield, director:

The weather has been unusually severe for an initial spring month. The temperature was considerably below the average, and the precipitation above, except in the locality of Saint Paul and Duluth, where there was a slight deficiency. An unusually large amount of snow remained on the ground at the close of the month. High winds were of frequent occurrence, but without dangerous gales. There was a comparative absence of serious snow blockades, although the drifting of snow on the 1st, 25th, and 26th caused slight delays to railroad traffic. The unusually large snowfall was not generally very favorable for logging operations.

Temperature (in degrees Fahr.).—The average for the state, 15.8, is 9.7 below that of the corresponding month of 1887, 11°.0 below that of 1886, and 8.4 below that of 1885. At Saint Paul it was 9.8 below the normal of fifteen years; La Crosse, 8.1 below; Duluth, 7.9 below; Moorhead 6.4 below; and Saint Vincent, 5.9 below. This is the lowest mean temperature recorded for the month of March since the stations were establishnd at La Crosse and Saint Paul. The highest mean temperature was reported from La Crosse, where it was 22.2, while the lowest was 7.8 at Saint Vincent, thus showing a range between the northern and southern portions of the state of 14.4. The warmer portions of the month were 8th and 9th, 13th to 15th, 17th to 20th, 26th to 31st. The highest temperature generally occurred during the third of these periods. The maximum for the month was 50.0, reported on the 18th at Rolling Green and Pine River Dam. The mild weather of the latter portion of the month caused the snow to melt rapidly. The colder portions of the month were 3d to 6th, 10th to 12th, 21st and 22d. On these dates the minimum temperature was generally below zero. The greatest cold was experienced during the last of these terms, when the temperature fell to —30.0 at Pokegama Falls Dam and Pine River Dam. On the same date at Saint Vincent it was —29.3; Leech Lake Dam, —29.0; Argyle, —26.5. The range of temperature for the state is 80.0, while the greatest range for any station is also 80.0, reported from Pine River Dam. The smallest ranges of temperature were reported in southern Minnesota, the lowest being 55.0 at Minneapolis.

Precipitation, including melted snow (in inches).—This has been mainly in the form of snow and unequally distributed, the greatest amount having fallen in the southeastern portion of the state, while the least fell in the northwestern and south-central portions. The average precipitation for the state is 1.79. This has been above the average of March for the past three years in this state by the following amounts: 1.28 in 1885; 0.70 in 1886; 1.45 in 1887. At the close of the month from 18 to 36 inches of snow remained on the ground in the region of the "Great Woods," while in the southeast portion of the state it averaged 24 and in the southwestern from 6 to 14. At the close of the corresponding months of the preceding three years snow had almost entirely disappeared, except in localities where there had been severe drifts. At La Crosse the precipitation was over two inches above the average of fifteen years; while at Saint Paul and Duluth it was slightly below.

The "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

Temperature (in degrees Fahr.).—Highest monthly mean, 58, at Mobile, Artonish Plantation, Biloxi; lowest monthly mean, 50, at University; absolute maximum, 86, at Edwards, on the 26th; absolute minimum, 25, at Starkville, on the 7th; range for state, 61; greatest monthly range, 57, at Edwards; least monthly range, 20, at Long Beach; greatest daily range, 41, at West Point, on the 3d; least daily range, 0?, on the 7th, at Lamar.

Precipitation, including melted snow (in inches).—Greatest, 11.15, at Starkville; least, 6.44, at Utica.

The month just passed was marked by unusually heavy rainfalls and an abnormally low temperature. The average temperature for the state, 54, is four degrees colder than that of the corresponding month of 1887. The maximum temperature was reached throughout the state on the 18th and 26th, and the minimum on the 7th and 12th. Three cold-wave warnings were received during the month, all of which were verified. The average rainfall for the state, 8.50 inches, is 5.60 inches in excess of the average for March, 1887.

The low temperature and excessive precipitation during the past month have retarded farming operations, and the crops are very backward as compared with former years. The heavy rains have done considerable damage.

The "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

The highest reported temperature was 90°, at Pro Tem. The lowest, 1°, at Oregon. The average of maximum temperatures was 77°.6, and the average of minimum 11°.3, making an average monthly range of 66°.3.

The average precipitation was 3.95 inches, which was 1.23 inches above the normal for February. The greatest amount reported was 6.67 inches, at Harrisonville, and the least was 1.76 inches at Steelville. The precipitation was unevenly distributed, the western and central portions of the state having excessive rains, while in the southern portions of the state there was a deficiency.

The "Nebraska Weather Service," Prof. Goodwin D. Swezey, of Doane College, Crete, director:

The month has been one of low mean temperature, but with considerable range of extremes and with abundant precipitation, more than usual of it falling as rain rather than snow, and not quite as well distributed through the month as usual.

Precipitation.—The portion of the state receiving decidedly the largest rainfall is the southeast section, in which the precipitation averaged 1¼ inches, and reached from and over that amount for a strip of country extending from Saline county northeast to Washington county. For the northeast section and lower Loup region the precipitation averaged about 2¼ inches, and for the Republican, Niobrara, and upper Platte regions somewhat over an inch, although falling below one inch for the extreme western end of the state. The snowfall was 4½ inches, being about the normal amount for March.

Temperature.—The mean temperature of March for the past eleven years has ranged from 29°.2 to 46°.8; for the past March it has been 29°.5. The highest temperatures during the same period have ranged from 55° to 86°, and the lowest from 22° to —15°. The maximum of the past month was 80°, and the minimum —15°.

The "Nevada Weather Service," Prof. Charles W. Friend, Carson City, director:

The mean pressure for March was a little below the normal. The highest occurred at all stations on the 11th, and the lowest on the 8th. The mean temperature was also somewhat below the normal. The highest temperature reported, 76°.5, occurred at Reno on the 17th; and the lowest,—4°, at Ely, on the 4th. In the eastern part of the state the highest temperature occurred in the second half of the month, and in the western part in the first half. Throughout the whole state the lowest temperature occurred from the 1st to 4th.

The rainfall has been generally much below the normal. In the southeastern part of the state, however, the precipitation was fully equal to the average for the month of March, Pioche reporting 2.40 inches and Ely 2.08 inches. At the former place the total depth of snowfall was 20.5 inches. From the 1st to the 9th, inclusive, precipitation was pretty general throughout the state. During the rest of the month the weather was mostly mild, pleasant and dry, with only occasional light rains.

Temperature (in degrees Fahr.).—The highest temperature, 71.8, occurred on the 12th and 22d; the lowest, 13.1, on the 1st. The range for the month was 58.7.

Precipitation (in inches).—The total precipitation was 0.54, or 1.29 below the normal. Light snow fell from the 1st to the 5th, inclusive; light rain on the 13th, 14th, 30th, and 31st. The deficiency of precipitation since January 1, 1888, is 2.86; deficiency since September 1, 1887, is 5.64.

The "New England Meteorological Society," Prof. Wm. H. Niles, of the Institute of Technology, Boston, Massachusetts, president:

The month can be conveniently considered in six divisions: (1) 1st–11th. In this period the pressure was generally above the normal, and cool, fair weather prevailed, but with occasional local snows, as a low area remained persistently off the coast of Newfoundland. Minimum temperatures were noted on the 2d and 7th. (2) 12th–14th. On these days heavy snow and rain occurred, as a severe cyclone reached New England from the southwest, and a cold wave from the northwest. (3) 15th–20th. Fair weather prevailed on these days, but the pressure was below the normal until the 18th (a low area continuing off Newfoundland) when it rose and temperatures near or below zero occurred on the 19th. (4) 21st–23d. Heavy rain and snow occurred on these days, during the passage of a cyclone from the Lakes over New England. (5) 24–25th. The pressure rose to its maximum for the month, 30.6 inches, and fair, cool weather prevailed. (6) 26th–31st. These days were stormy, with general rain or snow, dominated by three depressions. The first developed in the southwest and moved northeasterly into the Lake region and Canada on the 26th; on the 28th a barometric trough, with several storm-centres, extended from the Gulf of Mexico to Canada, which, by the 30th, had resolved itself into a single centre in Saint Lawrence Bay, while the third depression moved easterly across New England from the Lake region on the 31st.

The precipitation for the month was much in excess of the average for

March on account of the heavy amount recorded between the 12th and 14th. The mean temperature was 2°.5 below the monthly average.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 28.9 (one hundred and one stations); highest monthly mean, 33.4, at Plymouth, Mass.; lowest monthly mean, 20.1, at Chelsea, Mass.; absolute maximum, 63, at Stratford, Conn., on the 28th; absolute minimum, —23, at Berlin Falls, N. H., on the 19th; range for New England, 86; greatest monthly range, 76, at Stratford, Conn., and West Milan, N. H.; least monthly range, 37, at Block Island, R. I.; greatest daily range, 66, at West Milan, N. H., on the 19th; least daily range, 0, at Woonsocket, R. I., on the 29th.

Precipitation, including melted snow (in inches).—Average for New England, 5.59 (one hundred and twenty stations); greatest, 9.71, at Uncasville, Conn.; least, 2.79, at Weir's Bridge, N. H.

Wind.—Prevailing direction, northwest (twelve stations).

The "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

Temperature (in degrees Fahr.).—The average temperature for the state for the month, 32.8, is 0.8 below the average for the corresponding month of 1887, and 4.2 below the normal of a great number of years. At Newark, the record makes the mean temperature of March for the last forty-four years 37.4, which shows a deficiency of 4.7. Highest monthly mean, 35.9, at Salem; lowest monthly mean, 30.2, at Union; maximum, 72.0, at Readington, on the 31st; minimum, 4.0 below zero, at Paterson, on the 13th; range for the state, 7.60; greatest monthly range, 66.0, at Readington; least monthly range, 56.0, at Newark; greatest daily range, 42.0, at Gillette, on the 20th; least daily range, 1.0, at Hanover, on the 16th. Mean relative humidity, 79.8.

Precipitation, including melted snow (in inches).—Average for the state, 5.71; greatest, 8.22, at Trenton; least, 3.75, at Salem.

Prevailing direction of wind, northwest.

The "North Carolina Weather Service," Dr. Herbert Battle, of Raleigh, director:

Temperature (in degrees Fahr.).—Monthly mean, 47.6; highest monthly mean, 51.4, at Wilmington; lowest monthly mean, 42.7, at Lynchburg, Va.; maximum, 80.5, at Chattanooga, Tenn., on the 31st; minimum, 14.1, at Norfolk, Va., on the 14th; range for the state, 66.4; greatest monthly range, 64.5, at Davidson College; least monthly range, 42.0, at Salisbury; greatest mean daily range, 29.0, at Salem; least mean daily range, 13.1, at Hatteras.

Precipitation, including melted snow (in inches).—Average for the state, 6.23; greatest, 8.73, at Chapel Hill; least, 4.22, at Knoxville, Tenn.

Wind.—Prevailing directions, northwest and southwest.

The "Ohio Meteorological Bureau," Prof. B. F. Thomas, of the Ohio State University, Columbus, president; Charles E. Kilbourne, Secretary:

Temperature (in degrees Fahr.).—The mean temperature for the state is 34.2, which is 0.6 below the mean; the highest, 77, occurred at Portsmouth on the 20th, and the lowest, —6.2, at Wauseon on the 23d; the mean daily range for the state was 19; the greatest daily range was 45, at Hanging Rock on the 19th, and the least, 2, on the 25th at Youngstown and on the 28th at North Lewisburg and Cleveland (Hyde).

Humidity.—The mean relative humidity, 79.5 per cent., was 1.1 per cent. above the mean.

Precipitation, including melted snow (in inches).—The mean for the state, 3.54, is 1.07 above the mean for the past six years, leaving the deficiency for the year to April 1st 1.19; the greatest monthly rainfall was 5.65, at Paulding, and the least, 1.47, at Youngstown; the greatest daily rainfall, 1.46, occurred at Greenville on the 26th.

Cold-wave signals were ordered from Washington on the 16th, 20th, and 26th; the signals of the 20th and 26th were generally reported as justified, while that of the 16th was reported as justified at a few stations only; a decided cold wave occurred on the 3d.

"Oregon Weather Service," report prepared by B. S. Pague, Sergeant, Signal Corps, Roseburg, Oregon:

The marked characteristics of the month were the deficiency in temperature throughout the state, the fair weather, and the deficiency in precipitation in the northern part of the state.

Temperature.—The mean temperature of the state for the month was 42°.6 below the normal. It was below the normal in all sections, ranging from 0°.4 below at Roseburg, to 6°.5 below at Linkville. The highest mean temperature, 47°.2, was reported from Roseburg; the lowest mean, 34°.0, at Fort Klamath; the highest maximum temperature, 75°, was reported from Ashland; the lowest minimum, —3°, reported from Fort Klamath.

Precipitation (in inches).—The precipitation was below the normal in the northern part of the state, and nearly normal in the southern part. The greatest deficiency of precipitation for the month is at Portland, where it amounted to 3.47. For the season from July 1, 1887, to April 1, 1888, the precipitation is below the normal in all sections, ranging from 46 per cent. below at Lakeview, to 6 per cent. below at Eola.

The "Pennsylvania State Weather Service," report prepared under the direction of the Franklin Institute, Philadelphia, by Sergeant T. F. Townsend, Signal Corps:

Temperature (in degrees Fahr.).—The mean temperature for Pennsylvania for the month was 31.1, which is from 2 to 5 below the March average. The greatest departures occurred in the eastern portion of the state. The extreme low temperatures were not absolutely lower than usual, but they were of longer duration. The unusual cold, the numerous cloudy and stormy days, the severe storm of the 11th and 12th have all combined to make the past month exceptionally disagreeable. The minimum temperatures occurred on the 6th and 13th. The lowest are: Eagles Mere, —6.0; Bernice, —5.5; Drifton, —5.0; Dyberry, —5.0; and Montrose, —4.0. The maxima were during the latter part of the month, most of which were noted on the 20th, 21st, 30th, and 31st. The highest are Uniontown, 72.0; Pittsburg, 71.5; Philadelphia, 70.0; York, 69.0; and New Castle, 69.0.

Precipitation, including melted snow (in inches).—The average precipitation was 3.55. This amount was unevenly distributed, much the larger portion falling over the eastern section of the state, causing an excess, and leaving a deficiency in the western counties. The greatest precipitation occurred on the 11th, 12th, 21st, and 26th. The largest totals for the month are West Chester, 6.39; Contesville, 6.28; Philadelphia, 5.42; Swarthmore, 5.34; and Pottstown, 5.35.

The "South Carolina Weather Service," Hon. A. P. Butler, Com'r of Agriculture for South Carolina, Columbia, director:

This month is noted for its heavy rainfall; the greatest amount of precipitation occurred in the northern counties, and fell during the latter part of the month. The average amount for the state was 6.71 inches against 1.85 for March, 1887, an increase of four and three-quarter inches. A portion of the month was unfavorable for farming operations.

Summary.

Temperature (in degrees Fahrenheit).—Highest monthly mean, 57.1, at Hardeeville; lowest monthly mean, 47.7, at Kirkwood; maximum, 80.0, at Black's, Cedar Springs, and Hardeeville, on the 31st; minimum, 19.0, at Winnsborough, on the 22d; range for state, 61.0; greatest monthly range, 60.0, at Cedar Springs; least monthly range, 38.0, at Orangeburg; greatest daily range, 43.0, at Cedar Springs, on the 15th; least daily range, 0.1, on the 19th at Clinton.

Precipitation, including melted snow (in inches).—Greatest, 10.05, at Spartanburg; least, 2.87, at Hardeeville.

Wind.—Prevailing direction, southwest.

The following is an extract from the report of the "Meteorological Department of the State (Tennessee) Board of Health," prepared under direction of J. D. Plunket, M. D., President of the State Board of Health, by H. C. Bate, Signal Corps, Assistant, Nashville:

The month of March, with the exception of the first decade, had the usual features of high winds, electric storms, and, in many sections, an abnormally great rainfall. Altogether, it was a very disagreeable month.

The mean temperature was 46°.7, about the March average for the past six years. The highest temperature was 80°.5, recorded on the 31st, and was only half a degree below the highest March maximum during the past six years; the lowest was 12°, recorded on the 23d, and was 6° below the March minimum of last year, and 7° above that of 1885; the highest temperatures were recorded on the 18th, 20th, and 31st, and the lowest on the 8th and 11th in the middle and western divisions, and on the 23d in the eastern division. Cold-wave warnings were received on the 2d, 16th, 19th, 26th, and 27th, and were verified, except that of the 16th at Fayetteville and Gallatin, in the middle division, and Mason, in the western division, that of the 19th at Mason, and that of the 26th at Fayetteville.

The mean precipitation for the state was 6.02 inches, which was about an inch above the March mean for the past six years, but nearly two inches less than that in 1884; of this amount the eastern division received an average of four and three-fourths inches; the middle division seven inches; and the western division nearly six inches; the greater portion of the rain fell during the five days from the 25th to the 29th, inclusive. The rain of the 25–26th was one of the greatest known in the state, an average depth of 2.32 inches being recorded for the entire state. In many localities this was the greatest ever known, and was very destructive to fences along the water-courses, and to plowed lands. The rainfall was particularly heavy in the western portion of the middle division, and many great local daily falls were reported, notably at Lawrenceburg, where a fall of 4.71 inches was recorded for the twenty-four consecutive hours ending on the 26th; at Nunnelly, 4.01 inches; at Ashwood, 3.58 inches; at Hohenwald, 3.52 inches; and at Savannah, 3.22 inches. In other portions of the middle division were heavy falls, as at Fayetteville, 3.23 inches; Cookeville, 3.00 inches; Fostoria, 3.58 inches; Watkins, 2.50 inches; and at Kingston Springs, 2.40 inches. The greatest monthly fall was 9.90 inches, reported at Lawrenceburg, and the least, 2.12 inches, reported at Jonesborough. The 10th, 20th, 27th, and 28th were also days of heavy rainfall. Most of the rains were general, and those of the 5th, 11th, and 22d were accompanied with snow in the eastern and middle divisions. The 1st, 7th, 8th, 9th, 14th, 15th, 16th, 18th, 23d, and 31st were reported without measurable precipitation. Snow fell at most of the stations in the state, but mostly in the eastern division; the greatest depth reported was 1.75 inches, at Newport. At many places the fall was very light, not sufficient to measure. Frosts were reported on twenty-one days, the 1st to 4th, 17th, 24th to 28th being reported free from frost. The frosts of the 8th, 11th, 12th, 15th, 16th, and 23d were heavy, the others generally light. Hail fell in a few localities on the 20th, 26th, and 27th.

Table of miscellaneous meteorological data for March, 1888—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer.	Date.	Lowest barometer.	Date.	Monthly range of barometer.	Temperature: Monthly mean.	Departure from normal.	Extremes: Max.	Date.	Mean max.	Min.	Date.	Mean min.	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.	Departure from normal precipitation, in inches.	Winds: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.										29.6	−2.1														5.06	+0.72									
Eastport	53	29.86	+.04	29.92	30.64	26	29.41	17	1.23	29.0	+2.0	48.0	22	34.5	3.9	2	22.8	44.1	23.5	2	4.2	12	75.7	21.7	4.26	−0.80	9,724	nw.	72	e.	13	16	10	14	7
Portland	99	29.84	+.03	29.95	30.62	26	29.32	13	1.30	29.8	−2.2	47.1	29	35.2	7.3	7	22.4	39.8	23.1	2	3.5	12	71.7	21.0	3.72	+0.51	6,764	nw.	45	s.	21	11	11	14	6
Manchester	247	29.71	.....	29.98	30.61	26	29.22	13	1.39	29.1	−1.9	51.0	28	36.4	4.0	19	21.3	47.0	33.8	19	8.2	27	65.6	18.0	4.41	....	6,838	nw.	30	nw.	14	13	10	12	9
Northfield	871	29.03	.....	30.03	30.60	26	29.34	21	1.26	21.6	−4.4	47.9	28	30.1	−10.0	19	12.7	57.9	41.0	19	6.0	11	71.4	13.3	4.81	....	8,573	n.	40	n.	12	16	10	16	5
Boston	125	29.84	+.03	29.98	30.60	26	29.09	12	1.51	32.0	−1.0	57.5	21	39.7	11.8	24	24.8	45.7	26.7	1	3.5	12	68.7	22.1	3.32	−1.25	11,433	w.	60	e.	13	11	13	9	9
Edgartown	......	......	.....	......	......	..	......	..	....	32.4	......	56.0	31	39.0	11.4	5	25.9	44.4	24.0	4	3.5	2	....	......	3.30	....	......	nw.	...	......	..	10	..	..	..
Nantucket	14	29.96	.....	29.98	30.60	26	28.93	12	1.67	32.4	−0.6	53.5	31	38.9	15.1	24	26.9	38.4	22.0	23	5.2	15	83.2	27.6	3.14	....	9,601	nw.	54	se.	12	14	7	13	11
Wood's Holl	22	29.95	.....	29.97	30.58	26	28.92	12	1.66	31.6	......	52.0	28	38.4	13.4	4	23.7	38.6	22.0	23	7.9	26	78.5	25.2	4.63	....	13,947	w.	48	nw.	31	10	10	9	12
Vineyard Haven	......	......	.....	....	......	..	......	..	....	35.1	......	58.2	21	44.0	12.0	24	26.2	46.2	27.9	4	10.0	10	....	......	5.41	....	......	nw.	...	......	..	12	..	..	..
Block Island	26	29.95	+.02	29.98	30.57	25	28.92	13	1.65	30.8	−4.2	51.7	21	36.9	14.6	24	24.8	37.1	20.9	12	3.0	11	86.2	27.0	2.80	−1.49	15,044	nw.	70	e.	12	14	9	9	13
Narragansett Pier	......	......	.....	......	......	..	......	..	....	31.8	......	58.0	31	40.5	10.0	25	23.3	48.0	27.0	1	9.0	21	....	......	7.87	+4.18	......	nw.	...	......	..	13	..	..	..
New Haven	107	29.90	+.04	30.02	30.56	25	29.23	13	1.33	29.4	−3.6	55.0	31	37.0	5.0	13	22.0	50.0	28.0	12	4.8	11	72.0	20.7	7.46	+2.73	8,070	nw.	48	n.	12	12	9	9	13
New London	47	29.93	.00	29.98	30.55	25	29.05	13	1.50	32.3	−2.7	58.0	31	39.4	12.0	13	25.2	46.0	19.8	3	5.2	11	77.8	25.6	5.96	+1.16	7,253	nw.	50	s.	21	13	8	8	15
Mid. Atlantic States.										35.9	−3.6														4.94	+1.02									
Albany	85	29.96	+.06	30.06	30.56	25	29.39	21	1.17	26.3	−5.7	52.1	21	34.1	0.5	19	17.8	51.6	38.2	19	6.9	11	73.3	18.3	5.62	+2.86	6,716	nw.	40	sw.	21	13	16	6	9
New York City	185	29.84	+.04	30.05	30.56	25	29.38	21	1.18	32.0	−4.0	62.9	31	40.9	4.8	13	24.9	58.1	28.0	14	5.4	29	73.6	24.1	5.64	+1.78	10,470	nw.	50	w.	13	14	11	9	11
Philadelphia	117	29.95	+.06	30.08	30.57	25	29.36	21	1.21	35.1	−3.9	70.0	31	43.4	8.2	13	27.0	61.8	27.5	31	6.8	13	67.1	24.3	5.42	+2.27	10,586	nw.	60	nw.	12	14	12	10	9
Atlantic City	34	30.03	+.06	30.06	30.56	25	29.39	21	1.17	32.8	−4.2	69.5	31	41.3	10.0	6	26.1	59.5	30.0	31	5.8	28	81.1	27.4	4.15	+0.38	9,873	nw.	60	nw.	12	13	7	15	9
Baltimore	45	30.04	+.05	30.08	30.54	25	29.43	21	1.11	37.3	−3.7	73.5	31	44.9	12.0	13	29.6	61.5	28.7	31	6.4	13	64.6	25.1	4.62	+0.85	5,495	nw.	33	nw.	12	14	10	10	11
Washington City	106	29.99	+.07	30.11	30.51	25	29.42	21	1.09	37.4	−2.6	75.6	31	47.1	10.0	6	29.0	65.6	33.9	19	6.1	25	69.4	27.2	4.53	+0.32	6,152	nw.	42	nw.	13	12	9	11	11
Cape Henry	......	......	.....	......	......	..	......	..	....	42.6	......	71.0	21	50.9	19.5	23	35.0	51.5	30.0	17	4.4	12	....	......	4.70	−0.77	......	nw.	...	nw.	..	14	..	..	..
Lynchburg	652	29.38	+.05	30.09	30.46	10	29.43	21	1.03	42.7	−2.3	80.1	31	54.0	16.5	23	32.4	63.6	37.1	16	6.4	25	60.7	27.5	5.25	+1.36	3,907	nw.	29	nw.	14	11	9	11	11
Norfolk	69	30.02	+.05	30.09	30.48	10	29.41	21	1.07	43.9	−2.1	76.8	31	56.6	14.1	14	34.6	62.7	34.8	16	8.0	5	77.8	36.7	4.55	+0.11	7,929	se.	55	nw.	12	11	8	9	14
S. Atlantic States.										52.7	−1.4														5.10	+0.48									
Charlotte	808	29.26	+.07	30.12	30.50	23	29.58	21	0.92	49.3	+0.3	79.3	31	60.9	20.0	23	38.5	59.3	35.3	15	5.2	7	59.1	33.2	6.22	+1.09	4,753	sw.	30	nw.	22	10	8	11	12
Hatteras	12	30.13	+.10	30.15	30.50	10	29.60	21	0.90	48.0	−1.0	69.0	29	54.5	25.8	23	41.4	43.2	20.2	29	2.3	28	87.2	44.1	5.07	−1.80	12,352	ne.	60	nw.	12	10	7	12	12
Kitty Hawk	......	......	.....	......	......	..	......	..	....	48.5	......	75.8	31	58.8	21.6	14	38.2	54.2	32.9	29	10.1	21	....	......	6.75	+0.90	......	ne.	...	......	..	10	..	..	..
Raleigh	375	29.71	.....	30.11	30.49	23	29.48	21	1.01	46.8	−0.9	76.8	31	56.8	20.0	23	37.3	56.8	31.9	15	8.9	28	75.3	38.7	6.88	....	5,475	nw.	30	nw.	21	11	10	8	13
Southport	......	......	.....	......	......	..	......	..	....	51.3	......	75.1	3	59.9	23.5	23	42.8	51.6	28.0	3	6.0	27	....	......	7.05	+3.23	......	sw.	...	......	..	11	..	..	..
Wash Woods	......	......	.....	......	......	..	......	..	....	43.3	......	74.6	28	51.3	19.2	14	35.3	55.4	32.2	31	4.6	18	....	......	5.95	+2.22	......	ne.	...	......	..	13	..	..	..
Wilmington	52	30.06	+.06	30.12	30.50	23	29.56	21	0.94	51.4	−2.6	76.5	29	60.8	24.4	23	41.1	52.1	29.5	1	8.2	27	77.4	44.1	4.74	+0.53	6,587	sw.	35	sw.	22	10	8	10	12
Charleston	52	30.08	+.06	30.13	30.50	23	29.69	21	0.81	55.2	−1.8	74.0	3	64.0	29.5	23	46.9	44.5	27.0	21	10.0	28	74.2	46.0	3.64	−0.32	7,187	sw.	36	sw.	21	9	8	12	11
Columbia	......	......	.....	......	......	..	......	..	....	52.8	......	77.2	31	62.0	23.5	23	42.2	53.7	32.7	16	3.0	26	79.0	45.7	6.20	....	......	......	...	......	..	10	11	5	15
Augusta	183	29.95	+.06	30.15	30.54	23	29.66	21	0.88	54.0	−1.0	80.7	31	65.6	27.8	23	43.1	52.9	36.3	16	7.1	20	71.5	43.8	7.79	+2.48	3,092	w.	24	sw.	21	10	9	8	14
Savannah	87	30.05	+.05	30.14	30.52	23	29.68	21	0.84	56.4	−2.6	78.5	28	67.0	32.0	23	47.3	46.5	30.0	1	11.3	22	68.7	44.8	2.24	−1.57	6,067	s.	36	nw.	11	7	9	7	15
Jacksonville	43	30.09	+.04	30.14	30.50	23	29.78	5	0.72	60.3	−1.7	83.5	28	70.6	35.0	23	51.2	48.5	29.7	24	9.7	30	73.0	50.6	1.57	−1.93	5,715	ne.	29	s.	21	6	8	11	12
Florida Peninsula.										66.4	−2.2														0.92	−1.56									
Titusville	12	30.15	.....	30.16	30.46	23	29.84	5	0.62	63.4	......	87.0	29	70.7	41.0	23	55.9	46.0	24.5	17	7.3	27	80.0	56.6	2.16	....	7,559	se.	30	se.	25	8	3	14	14
Cedar Keys	22	30.13	+.05	30.15	30.48	23	29.84	21	0.64	61.4	−2.6	73.6	28	67.8	37.0	23	55.2	36.6	23.2	24	3.0	29	73.0	51.8	0.94	−3.26	7,926	s.	36	s.	21	7	5	17	9
Key West	22	30.10	+.02	30.12	30.31	23	29.93	6	0.38	71.3	−1.7	81.8	31	75.6	58.4	13	67.0	23.4	14.0	19	4.1	11	78.5	64.0	0.91	+0.13	8,519	e.	36	n.	22	5	5	18	8
Jupiter	28	30.10	.....	30.13	30.36	23	29.84	5	0.52	68.1	......	83.4	21	75.2	45.0	13	61.7	38.4	23.1	14	6.0	19	73.3	58.7	1.25	....	8,745	se.	29	n.	23	5	3	19	9
Eastern Gulf States.										56.7	−1.5														8.36	+1.98									
Atlanta	1,129	29.94	+.05	30.14	30.50	23	29.64	20	0.76	50.6	−1.4	77.3	31	60.5	24.0	23	41.6	53.3	28.3	8	6.3	27	62.6	36.6	8.16	+1.46	8,519	nw.	48	nw.	22	11	6	10	15
Pensacola	30	30.06	+.01	30.12	30.45	23	29.74	20	0.71	59.5	−0.5	76.2	31	66.3	37.7	12	52.8	38.5	23.0	8	4.0	25	72.6	49.6	8.90	+3.65	6,894	n.	42	se.	26	11	8	12	11
Mobile	35	30.09	+.03	30.13	30.47	23	29.71	20	0.76	57.5	−2.5	75.5	28	66.4	35.0	13	49.0	40.5	25.0	2	6.5	20	80.7	51.1	7.24	−0.69	7,314	n.	36	se.	20	11	9	14	8
Montgomery	217	29.89	+.04	30.13	30.49	23	29.60	20	0.89	56.6	−0.4	82.1	20	67.2	30.8	8	46.1	51.3	30.5	24	6.3	10	58.8	40.0	11.51	+5.39	4,946	nw.	30	nw.	11	12	9	8	14
Vicksburg	222	29.88	+.04	30.12	30.57	11	29.66	19	0.91	55.7	−2.3	83.5	26	65.9	31.2	7	46.1	52.3	30.4	16	5.7	28	71.5	45.4	7.92	+1.60	6,172	n.	36	nw.	20	12	11	7	13
University	......	......	.....	......	......	..	......	..	....	50.5	......	77.2	18	60.6	27.8	12	40.8	49.4	33.6	16	8.7	6	70.2	40.1	8.06	....	......	......	...	......	..	11	12	7	12
New Orleans	52	30.05	+.03	30.07	30.46	12	29.68	20	0.78	60.3	−1.7	78.0	26	69.3	40.7	12	52.7	37.3	24.0	11	9.0	19	72.2	50.1	6.45	+0.46	7,260	se.	33	s.	5	13	7	17	7
Auburn	......	......	.....	......	......	..	......	..	....	52.6	......	78.0	28	63.7	28.0	23	45.5	50.0	26.0	21	6.0	20	....	......	11.24	....	......	se.	...	......	..	9	..	..	..
Western Gulf States.										54.9	−3.7														5.33	+2.03									
Shreveport	249	29.83	+.04	30.09	30.55	11	29.50	25	1.05	54.7	−3.3	81.0	31	65.4	32.5	11	45.6	48.5	34.8	10	4.6	28	76.3	46.5	9.00	+4.33	5,773	s.	30	nw.	24	13	11	10	10
Fort Smith	470	29.60	+.07	30.11	30.64	11	29.52	19	1.12	47.8	−3.2	83.6	31	59.7	23.0	11	38.3	60.6	39.0	13	6.6	3	63.8	34.4	3.09	+1.15	4,775	se.	30	nw.	20	10	9	11	11
Little Rock	309	29.78	+.04	30.11	30.60	11	29.59	19	1.01	49.7	−3.3	80.5	31	60.8	25.2	11	39.2	55.3	35.3	13	5.5	24	66.0	37.3	5.06	+0.44	5,309	nw.	24	nw.	27	14	15	5	11
Corpus Christi	20	30.05	+.02	30.07	30.54	12	29.62	25	0.92	61.9	−2.1	81.7	10	66.9	41.0	11	54.4	40.7	30.4	19	4.5	14	80.2	55.2	2.98	....	9,760	se.	54	e.	18	7	15	13	3
Galveston	40	30.00	+.05	30.10	30.52	12	29.64	25	0.88	60.1	−2.9	75.0	10	65.3	42.5	11	54.5	32.5	20.0	10	2.5	20	78.2	52.9	2.84	−0.23	8,543	s.	50	n.	10	8	10	14	7
Palestine	533	29.54	+.03	30.10	30.57	11	29.53	25	1.04	53.3	−5.6	78.8	31	63.5	29.3	11	44.1	49.5	32.9	8	6.8	4	72.4	43.5	9.84	+6.56	7,922	s.	33	w.	19	10	12	11	8
San Antonio	781	29.26	+.04	30.09	30.58	11	29.60	25	0.98	56.6	−5.4	79.0	25	66.3	36.7	6	48.7	42.3	35.1	29	7.3	14	68.7	44.9	2.13	−0.07	7,298	nw.	36	ne.	11	12	18	11	2
Rio Grande Valley.										64.8	−3.7														3.57	+2.30									
Rio Grande City	230	29.85	+.03	30.10	30.62	11	29.64	25	0.98	64.2	−4.8	89.3	25	74.2	41.0	29	56.3	48.3	36.0	29	7.0	8	77.1	55.6	4.83	+3.66	5,336	se.	28	s.	23	5	12	12	7
Brownsville	57	30.00	+.03	30.06	30.54	11	29.62	25	0.92	65.4	−2.6	85.0	10	72.3	45.1	6	58.4	39.9	23.8	11	4.6	14	83.0	59.8	2.31	+0.93	7,227	s.	38	s.	1	8	13	12	6
Ohio Val. & Tenn.										42.5	−1.6														4.79	+0.29									
Chattanooga	783	29.31	+.06	30.15	30.52	23	29.49	20	1.03	49.3	−0.7	80.5	31	59.6	22.4	23	39.8	58.1	36.9	16	6.2	6	69.3	38.2	6.86	+0.08	6,012	s.	42	w.	11	12	11	11	9
Knoxville	980	29.09	+.00	30.15	30.52	23	29.56	20	0.96	46.9	−0.1	76.4	20	57.4	19.0	23	37.2	57.4	37.5	16	7.5	7	64.8	34.4	4.22	−1.73	4,846	n.	38	s.	26	10	13	9	9
Memphis	320	29.75	+.03	30.10	30.54	12	29.62	20	0.92	49.5	−1.5	80.0	18	58.9	28.0	11	40.9	52.0	32.0	18	3.5	5	70.3	39.0	5.40	−0.28	5,932	nw.	36	nw.	26	16	15	4	12
Nashville	549	29.52	+.05	30.11	30.48	11	29.52	20	0.96	46.6	−1.4	78.2	26	56.5	23.0	23	37.8	55.2	26.8	16	4.8	6	67.0	34.7	6.46	+1.35	6,104	nw.	37	w.	22	14	12	9	10
Louisville	551	29.52	+.06	30.12	30.50	12	29.58	20	0.92	43.6	−0.4	73.5	31	52.7	13.8	22	33.6	59.7	32.6	30	7.2	4	67.0	32.5	5.71	+1.77	7,278	n.	36	w.	22	19	14	11	6
Indianapolis	766	29.28	+.08	30.12	30.50	12	29.49	20	1.01	35.7	−3.3	69.0	19	43.9	8.8	22	27.9	60.2	29.2	2	6.4	28	70.0	26.0	4.26	+0.47	5,173	nw.	26	nw.	22	14	14	8	9
Terre Haute	......	......	.....	......	......	..	......	..	....	38.5	......	67.3	31	47.7	7.8	22	29.3	59.5	30.8	30	8.2	24	....	......	3.85	....	......	w.	...	......	..	13	..	..	..
Cincinnati	628	29.44	+.08	30.13	30.50	12	29.56	20	0.94	39.0	−3.0	70.9	26	46.7	12.3	22	30.7	58.6	30.2	30	4.4	24	68.5	28.5	3.94	+0.47	6,550	n.	36	nw.	21	16	11	11	9
Columbus	812	29.24	+.09	30.13	30.48	9	29.51	20	0.97	35.3	−2.7	70.4	19	45.1	6.5	22	27.9	63.9	32.6	19	7.1	24	67.8	24.9	3.79	+0.80	7,024	w.	37	w.	22	15	12	12	7
Pittsburg	847	29.17	+.07	30.06	30.48	9	29.16	21	1.32	36.3	−1.7	71.5	20	46.4	9.1	13	27.5	62.4	36.0	19	8.4	13	71.2	27.3	2.51	−0.36	6,433	nw.	39	sw.	21	15	14	13	4
Lexington	......	29.01	.....	......	......	..	......	..	....	40.6	......	74.5	26	51.2	12.7	22	31.6	61.8	31.9	30	8.0	10	68.8	30.2	5.82	....	4,939	nw.	36	sw.	26	16	13	11	7
Lower lake region.										27.6	−3.8														2.59	−0.17									
Buffalo	690	29.33	+.10	30.10	30.51	25	29.16	21	1.35	25.0	−3.0	63.0	19	33.0	1.6	13	18.5	61.4	36.0	19	5.3	5	77.0	18.5	2.07	−0.78	9,264	sw.	42	sw.	21	17	16	12	3
Oswego	335	29.70	+.08	30.08	30.53	25	29.44	21	1.09	23.6	−5.4	50.4	20	31.0	−1.0	5	16.7	51.4	33.6	19	6.1	15	81.3	18.5	1.79	−1.19	10,395	w.	39	n.	12	15	20	9	2
Rochester	621	29.40	+.10	30.10	30.53	25	29.21	21	1.32	24.7	−4.3	59.0	20	32.9	0.0	13	18.1	59.0	37.0	19	4.6	5	83.3	19.9	2.34	−0.74	10,552	w.	58	w.	21	24	16	12	3
Erie	681	29.35	+.10	30.11	30.56	9	29.14	21	1.42	27.0	−4.0	67.4	19	36.5	3.0	24	20.0	64.4	38.9	19	5.5	28	76.9	20.2	2.04	−1.03	7,879	w.	43	s.	26	16	12	14	5
Cleveland	690	29.35	+.09	30.12	30.51	9	29.40	21	1.11	30.6	−1.4	68.1	19	39.4	7.8	13	22.9	60.3	33.8	15	4.9	28	74.6	22.9	3.23	+0.36	8,002	w.	32	sw.	26	17	12	16	3
Sandusky	638	29.42	+.09	30.14	30.50	9	29.47	20	1.03	30.8	−3.2	71.6	19	40.1	6.1	23	23.2	65.5	37.6	19	3.7	28	75.3	23.3	2.85	+0.25	11,326	sw.	43	w.	11	11	15	10	6
Toledo	673	29.38	+.10	30.12	30.50	12	29.48	20	1.02	30.1	−3.9	69.4	19	39.1	4.5	22	21.5	64.9	38.9	19	5.3	28	73.4	21.7	3.63	+1.53	8,701	w.	40	s.	20	11	13	14	4
Detroit	662	29.38	+.10	30.12	30.50	4	29.45	20	1.05	28.6	−5.4	65.0	19	36.7	2.0	23	20.5	63.0	36.0	19	4.5	16	73.8	20.5	2.76	+0.22	8,506	w.	32	e.	25	12	13	14	4
Upper lake region.										21.1	−5.1														2.14	+0.08									
Alpena	609	29.43	+.11	30.13	30.69	4	29.40	20	1.24	18.6	−3.4	49.2	20	26.5	−10.2	23	9.7	54.9	27.8	18	4.5	27	84.0	14.4	2.24	+0.08	7,778	w.	36	w.	11	14	14	9	8
Escanaba	608	29.44	+.11	30.15	30.68	3	29.47	19	1.21	15.1	−5.9	42.8	10	24.9	−16.4	23	4.6	59.2	32.1	25	6.0	20	78.7	9.4	2.55	+0.81	5,969	n.	42	n.	10	8	10	8	11
Grand Haven	620	29.41	+.08	30.11	30.54	3	29.41	19	1.13	24.4	−5.6	63.7	19	32.0	1.0	13	17.8	62.7	28.6	19	5.2	31	81.4	19.2	2.40	−0.03	9,801	nw.	42	nw.	21	13	15	13	3
Lansing	883	29.13	.....	30.13	30.52	12	29.41	20	1.11	26.6	−5.4	69.5	19	36.2	1.9	23	17.7	67.6	36.0	19	5.0	27	78.9	20.4	2.01	....	6,945	nw.	34	nw.	11	12	10	15	6
Mackinaw City	605	29.43	+.10	30.12	30.63	3	29.37	19	1.26	15.5	−6.5	41.5	19	24.2	−11.0	23	5.8	52.5	38.3	9	5.8	10	83.3	11.0	1.00	+0.22	9,544	nw.	60	e.	1	9	9	11	11
Marquette	672	29.38	+.10	30.16	30.71	3	29.53	21	1.18	14.5	−7.5	40.4	19	22.0	−13.8	23	6.3	54.2	26.1	15	5.4	1	73.7	7.6	2.80	+1.42	6,549	nw.	34	nw.	10	14	11	8	12
Port Huron	639	29.41	+.12	30.13	30.52	9	29.41	20	1.11	25.2	−1.8	61.2	19	33.3	−3.9	23	17.5	65.1	34.7	19	3.2	1	78.2	18.9	2.24	−1.09	9,551	w.	43	w.	2	16	11	15	5
Chicago	715	29.33	+.08	30.11	30.55	12	29.44	20	1.11	30.5	−3.5	64.0	19	37.1	−0.9	22	22.7	64.9	30.4	20	3.4	28	72.0	22.2	2.99	+0.36	8,941	ne.	37	w.	21	12	13	11	7
Milwaukee	697	29.33	+.08	30.10	30.57	3	29.39	19	1.18	26.1	−3.9	60.5	19	33.0	−2.3	22	19.5	62.8	27.5	21	3.5	1	79.5	20.4	2.25	−0.36	9,274	w.	46	w.	21	14	11	13	7
Green Bay	610	29.44	.....	30.14	30.66	3	29.45	19	1.21	20.3	−4.7	43.5	19	28.2	−8.2	4	10.9	51.7	29.4	6	7.3	2	83.4	15.7	5.69	....	6,165	ne.	32	w.	21	11	15	10	6
Duluth	672	29.40	+.11	30.18	30.71	3	29.53	18	1.18	15.4	−7.6	45.0	29	24.6	−13.5	22	6.6	58.5	28.4	21	8.4	27	80.2	12.0	0.81	−0.69	6,442	ne.	40	ne.	1	12	11	11	9
Extreme northwest.										10.9	−8.3														0.92	+0.34									
Moorhead	926	29.12	+.08	30.20	30.79	3	29.44	18	1.35	12.3	−6.7	40.5	18	22.2	−20.0	3	2.7	60.5	31.0	22	7.0	30	82.4	7.7	1.04	+0.24	8,625	n.	50	s.	14	11	13	12	6
Saint Vincent	804	29.28	+.09	30.21	30.82	3	29.35	18	1.47	7.8	−6.2	40.7	18	19.1	−29.3	22	−4.0	70.0	38.0	9	8.5	25	86.0	4.4	0.93	+0.44	7,553	nw.	54	nw.	20	9	5	14	12
Bismarck	1,681	28.29	+.08	30.19	30.76	3	29.40	18	1.36	13.4	−9.6	46.8	16	22.2	−20.4	2	3.4	67.2	42.4	22	3.2	25	83.8	9.1	0.87	−0.16	8,045	nw.	50	nw.	20	11	5	19	7
Fort Buford	1,930	28.02	+.06	30.10	30.67	2	29.42	18	1.25	13.1	−10.9	51.0	17	26.6	−27.8	2	2.0	78.8	44.5	10	11.4	25	83.0	8.6	0.44	+0.04	7,076	nw.	46	nw.	20	7	7	19	5
Fort Totten	1,487	28.48	+.08	30.20	30.79	3	29.34	18	1.45	7.9	−8.1	40.6	18	18.0	−22.3	3	−2.4	62.9	33.7	22	6.2	25	89.8	5.5	0.79	+0.46	11,177	n.	58	n.	18	8	9	10	12
Fort Yates	......	......	.....	......	......	..	......	..	....	16.5	......	48.8	17	26.1	−18.4	2	6.9	67.2	42.8	22	6.2	6	....	......	1.42	+1.04	......	nw.	...	......	..	6	..	..	..

Table of miscellaneous meteorological data for March, 1888—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer.	Date.	Lowest barometer.	Date.	Monthly range of barometer.	Temperature of the air: Monthly mean.	Departure from normal.	Extremes: Max.	Date.	Mean max.	Min.	Date.	Mean min.	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.	Departure from normal precipitation, in inches.	Winds: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Upper Miss. Valley.										31.3	− 5.2														3.34	+ 1.08									
Saint Paul	831	29.19	+.08	30.12	30.70	3	29.46	18	1.24	18.2	− 9.8	42.0	18	28.2	−13.7	22	9.4	55.7	33.2	21	9.7	26	81.9	13.3	1.11	− 0.34	6,159	w.	36	nw.	21	9	13	15	3
La Crosse	744	29.32	+.10	30.16	30.70	3	29.49	18	1.21	22.2	− 7.8	48.8	18	30.1	− 9.7	22	14.1	58.5	26.0	21	8.0	17	73.3	14.1	4.12	+ 2.54	6,005	nw.	32	w.	21	9	12	14	5
Davenport	615	29.42	+.05	30.10	30.59	3	29.38	19	1.21	30.1	− 4.9	61.0	18	38.5	− 0.5	22	22.2	61.5	35.3	2	4.8	4	74.0	22.3	2.70	+ 0.53	7,537	nw.	48	nw.	21	11	10	12	9
Des Moines	866	29.16	+.05	30.11	30.67	3	29.45	18	1.22	29.0	− 6.0	72.9	18	39.6	− 4.6	6	20.7	77.5	42.1	18	5.4	24	77.4	22.2	3.09	+ 1.70	4,231	nw.	24	nw.	10	9	10	13	8
Dubuque	665	29.39	+.09	30.13	30.66	3	29.36	19	1.30	26.7	− 5.3	57.5	19	34.3	− 4.6	22	18.4	62.1	27.2	7	5.5	4	75.2	19.5	3.44	+ 1.05	5,124	nw.	30	nw.	21	9	10	13	8
Keokuk	618	29.40	+.04	30.07	30.57	3	29.41	19	1.16	34.2	− 3.8	69.8	18	44.6	5.0	22	25.6	64.8	37.8	18	5.4	25	70.6	24.9	3.45	+ 1.32	8,317	nw.	36	nw.	21	11	8	13	10
Cairo	359	29.73	+.06	30.12	30.55	11	29.57	20	0.98	44.9	− 2.1	76.2	31	53.0	21.0	22	36.5	55.2	32.1	18	2.6	4	68.6	34.1	4.91	+ 1.12	7,410	n.	30	n.	27	12	16	5	10
Springfield	644	29.42	+.06	30.12	30.58	3	29.52	19	1.06	35.4	− 4.6	66.2	30	45.0	6.0	22	26.5	60.2	32.8	23	7.0	24	72.5	26.9	3.48	+ 0.88	7,420	s.	28	nw.	21	12	12	10	9
Saint Louis	571	29.47	+.03	30.10	30.55	11	29.51	19	1.04	40.8	− 2.2	76.0	30	50.8	14.0	22	31.1	62.0	35.5	23	8.1	21	70.8	30.7	3.79	+ 0.88	9,663	n.	48	w.	20	11	14	6	11
Missouri Valley.										27.9	− 6.0														2.06	+ 0.84									
Lamar	1,028	29.01	.....	30.13	30.71	11	29.42	19	1.23	41.9	......	83.8	31	53.8	13.9	22	31.7	69.9	38.6	2	4.6	6	71.9	32.2	2.36	+ 0.41	8,961	s.	37	nw.	25	12	12	9	10
Springfield	1,356	28.62	+.03	30.09	30.64	11	29.48	19	1.16	41.5	− 2.5	83.0	31	53.5	12.7	22	32.6	70.3	36.3	30	5.5	4	72.5	31.8	2.46	....	8,882	s.	40	se.	25	14	11	10	10
Leavenworth	842	29.18	+.03	30.09	30.65	11	29.42	19	1.23	37.0	− 4.0	78.5	18	49.0	10.8	6	26.7	67.7	41.4	19	5.4	4	67.9	26.7	4.55	+ 2.32	6,354	s.	28	s.	18	11	11	9	11
Topeka	......	......	.....	......	......	..	......	..	....	37.0	......	81.8	18	50.2	7.8	5	24.1	74.0	43.1	9	9.3	26	75.0	29.1	3.21	....	......	......	...	......	..	13	12	6	13
Omaha	1,113	28.91	+.05	30.14	30.72	3	29.45	18	1.27	28.8	− 6.2	78.3	18	39.4	− 3.9	6	20.3	82.2	36.5	18	5.9	4	74.2	21.1	3.25	+ 1.83	7,485	n.	36	n.	19	10	10	12	9
Crete	......	......	.....	......	......	..	......	..	....	29.2	......	79.9	18	41.5	−13.0	6	18.9	92.9	42.2	19	7.0	4	80.0	23.2	4.63	....	......	......	...	......	..	8	10	13	8
Valentine	2,614	27.29	.....	30.10	30.66	2	29.47	18	1.19	24.8	− 5.2	67.0	17	37.7	−15.0	2	12.9	82.0	47.4	22	9.2	4	68.8	14.9	1.44	+ 1.06	8,848	n.	38	nw.	21	10	6	13	12
Fort Sully	1,600	28.36	+.05	30.14	30.70	3	29.39	18	1.31	20.5	− 8.5	59.5	17	30.8	−12.9	3	11.0	72.4	46.5	22	4.0	9	71.6	12.0	0.49	− 0.39	7,623	nw.	36	nw.	21	7	6	16	9
Huron	1,307	28.69	+.05	30.15	30.75	3	29.43	18	1.32	19.2	− 8.8	50.5	18	29.4	−13.8	3	10.1	64.3	41.6	22	7.8	25	76.8	12.7	1.22	+ 0.53	8,498	nw.	45	nw.	21	11	8	15	8
Yankton	1,234	28.76	+.04	30.12	30.71	3	29.33	18	1.38	23.5	− 6.5	69.2	18	34.8	−17.5	6	13.9	86.7	35.5	6	6.0	24	75.3	16.1	1.24	+ 0.12	7,451	nw.	36	n.	19	10	10	12	9
Northern slope.										21.5	−10.3														1.31	+ 0.68									
Fort Assinaboine	2,720	27.19	+.06	30.13	30.62	2	29.49	17	1.13	18.6	−11.4	60.2	17	29.2	−26.0	19	8.4	86.2	49.2	11	6.8	31	69.0	9.9	0.95	+ 0.36	6,845	sw.	44	sw.	19	7	8	18	5
Fort Custer	3,040	26.85	+.05	30.11	30.64	2	29.51	23	1.13	23.0	−10.0	66.6	17	33.9	−26.3	2	12.0	92.9	43.3	11	6.3	25	75.1	15.1	0.35	− 0.21	4,885	n.	38	n.	18	11	9	17	5
Fort Maginnis	4,340	25.48	−.01	30.04	30.48	3	29.52	17	0.90	20.2	−10.8	60.0	13	33.3	22.7	2	9.9	82.7	40.8	10	7.6	25	80.0	14.5	3.21	+ 1.98	8,045	nw.	70	nw.	24	12	10	15	6
Helena	4,069	25.79	−.01	30.08	30.46	11	29.52	23	0.94	23.2	−10.8	63.5	17	33.2	−13.0	2	14.5	76.5	29.5	24	7.5	7	58.8	9.7	1.32	+ 0.89	4,682	sw.	36	sw.	27	10	12	16	3
Poplar River	2,030	27.92	+.05	30.16	30.72	2	29.50	17	1.22	9.5	−16.5	46.2	13	22.0	−34.9	10	− 2.9	81.1	49.9	10	9.0	28	80.7	4.4	0.41	+ 0.12	5,381	ne.	42	n.	20	8	4	17	10
Cheyenne	6,105	23.89	−.03	30.01	30.51	11	29.34	18	1.17	29.3	− 4.7	64.2	31	41.5	− 4.8	5	15.7	69.0	41.2	22	11.8	4	56.7	9.3	2.04	+ 1.46	8,816	nw.	45	w.	29	12	6	16	9
Laramie	......	......	.....	......	......	..	......	..	....	30.6	......	71.0	31	44.8	−10.4	10	16.3	81.4	46.8	22	8.0	26	....	......	0.70	+ 0.01	......	w.	...	......	..	11	..	..	..
North Platte	2,841	27.07	+.02	30.10	30.59	11	29.44	18	1.15	26.9	− 8.1	74.0	14	40.4	−13.7	5	15.9	87.7	42.1	14	5.8	26	74.9	18.4	1.44	+ 0.86	7,518	n.	39	n.	19	10	9	11	11
Rapid City	......	26.60	.....	......	......	..	......	..	....	24.9	......	66.0	17	36.1	−15.7	2	12.9	81.7	43.0	22	10.8	8	78.3	18.8	1.70	....	6,493	ne.	36	n.	20	11	12	10	9
Fort Washakie	......	24.35	.....	......	......	..	......	..	....	27.2	......	62.0	17	37.7	− 8.0	27	15.0	70.0	35.8	27	8.5	25	69.8	16.9	1.92	....	3,665	sw.	36	sw.	21	8	10	17	4
Fort McKinney	......	24.90	.....	......	......	..	......	..	....	22.7	......	59.0	17	32.9	−10.0	1	12.6	69.0	37.0	24	3.0	28	57.0	8.8	1.02	....	7,952	nw.	48	nw.	24	11	9	13	7
Middle slope.										36.5	− 4.5														1.13	+ 0.23									
Colorado Springs	......	......	.....	......	......	..	......	..	....	35.2	......	72.6	31	51.3	0.8	27	19.4	71.8	41.7	22	19.8	4	54.2	16.3	0.28	....	......	......	...	......	..	9	4	13	14
Denver	5,281	24.66	.00	30.00	30.51	11	29.29	18	1.22	33.4	− 5.6	70.0	31	47.4	− 1.5	5	20.2	71.5	41.8	22	7.8	26	54.9	14.9	1.15	+ 0.22	4,220	s.	36	ne.	19	11	8	10	13
Pike's Peak	14,134	17.54	.....	29.98	30.74	10	29.33	18	1.41	8.2	......	28.4	14	15.7	−11.7	28	2.0	40.1	25.2	4	5.3	21	73.4	0.0	1.47	− 0.67	18,505	sw.	87	sw.	8	11	1	15	15
Las Animas	3,899	25.97	−.02	29.98	30.57	11	29.06	18	1.51	37.6	− 2.4	79.0	31	54.5	6.3	20	21.8	72.7	50.5	13	12.5	26	51.5	16.1	0.64	+ 0.27	5,641	e.	60	n.	19	5	7	14	10
Concordia	1,384	28.58	.....	30.08	30.66	22	29.41	18	1.25	33.5	− 4.5	81.0	18	45.9	0.8	6	22.5	80.4	39.0	11	7.8	4	68.3	23.1	3.37	+ 1.97	6,836	n.	37	n.	19	8	7	12	12
Dodge City	2,524	27.38	+.01	30.08	30.70	11	29.41	18	1.29	30.5	− 5.5	75.0	24	51.1	− 1.8	5	23.7	76.8	43.5	13	7.0	3	67.5	24.5	0.93	+ 0.12	9,321	s.	56	s.	8	7	3	15	13
Fort Reno	......	......	.....	......	......	..	......	..	....	46.4	......	90.2	31	60.9	14.6	5	31.9	75.6	......	..	......	..	....	......	1.14	− 0.20	......	s.	...	......	..	8	..	..	..
Fort Supply	......	......	.....	......	......	..	......	..	....	44.2	......	82.8	31	57.7	10.2	5	30.7	72.6	43.7	13	8.0	21	....	......	0.31	− 0.50	......	n.	...	......	..	4	..	..	..
Fort Elliott	2,650	27.24	+.01	30.00	30.66	11	29.22	19	1.44	41.4	− 4.6	87.2	31	56.3	8.6	5	27.7	78.6	47.0	12	8.6	4	66.2	28.1	0.40	− 0.21	10,623	n.	64	nw.	19	6	4	10	17
Southern slope.										48.6	− 4.7														1.37	+ 0.52									
Fort Sill	1,200	28.81	+.03	30.08	30.70	11	29.39	19	1.31	45.9	− 4.1	86.5	31	60.2	19.7	5	33.9	66.8	44.5	31	7.2	3	72.6	36.7	1.10	− 0.19	10,122	s.	48	s.	8	9	6	11	14
Abilene	1,748	28.23	+.02	30.06	30.68	11	29.50	19	1.18	49.8	− 6.2	87.1	31	62.3	22.9	11	39.5	64.2	35.8	10	7.2	18	75.5	40.8	1.16	− 0.09	10,922	sw.	37	s.	1	6	5	15	11
Fort Davis	4,928	25.14	−.03	29.97	30.52	11	29.59	19	0.93	50.1	− 3.9	78.0	31	62.3	26.2	12	38.4	51.8	37.7	30	9.3	18	41.0	24.6	0.40	+ 0.05	5,962	sw.	50	sw.	3	3	1	13	17
Fort Stanton	6,154	23.87	.....	29.86	30.39	11	29.29	19	1.10	38.9	......	66.5	31	52.1	10.2	28	26.6	56.3	44.7	13	6.3	27	41.8	13.8	2.82	+ 2.30	6,075	nw.	42	w.	1	5	4	10	17
Southern plateau.										48.7	− 1.9														1.10	+ 0.12									
El Paso	3,764	26.21	−.01	29.96	30.44	12	29.54	19	0.90	54.6	− 1.4	84.5	31	68.1	28.3	12	39.6	56.2	43.7	14	16.0	1	48.1	33.5	0.95	+ 0.48	3,304	w.	22	se.	17	3	1	9	21
Lava	......	......	.....	......	......	..	......	..	....	47.8	......	75.8	23	62.7	23.2	3	32.8	52.6	43.6	23	19.0	17	....	......	0.70	+ 0.34	......	sw.	...	......	..	6	..	..	..
Santa Fé	7,026	23.17	−.04	29.97	30.49	11	29.37	19	1.12	37.4	− 1.6	64.0	31	49.1	14.0	2	27.3	50.0	36.8	22	9.5	5	54.4	19.6	0.61	+ 0.02	4,619	sw.	30	sw.	25	11	5	11	15
Fort Bowie	......	......	.....	......	......	..	......	..	....	48.2	......	70.5	31	57.7	29.5	2	38.7	41.0	27.5	12	10.0	27	....	......	1.92	− 0.40	......	sw.	...	......	..	10	..	..	..
Fort Grant	4,910	25.14	−.06	29.98	30.29	12	29.70	19	0.59	48.2	− 2.8	71.3	15	59.7	26.8	2	37.7	44.5	32.2	12	8.2	20	40.6	23.2	0.83	− 0.36	3,461	w.	48	se.	17	5	5	12	14
Fort McDowell	......	......	.....	......	......	..	......	..	....	55.6	......	84.0	31	70.7	30.0	28	40.4	54.0	44.0	21	10.0	25	....	......	0.62	− 0.77	......	sw.	...	......	..	7	..	..	..
Fort Thomas	2,710	......	.....	......	......	..	......	..	....	54.0	......	78.7	23	69.4	28.0	2	38.7	49.8	45.2	14	10.5	26	....	......	1.78	+ 0.69	......	w.	...	......	..	9	..	..	..
Fort Verde	......	......	.....	......	......	..	......	..	....	49.7	......	78.8	31	64.3	27.0	2	35.1	......	......	..	......	..	....	......	1.78	+ 0.39	......	......	...	......	..	8	..	..	..
Prescott	5,389	24.64	−.06	29.95	30.43	12	29.64	25	0.79	40.9	− 2.1	69.0	22	53.6	5.0	2	27.7	64.0	38.1	22	7.3	8	65.5	28.5	1.66	+ 0.22	5,699	sw.	36	sw.	19	7	6	10	15
San Carlos	......	......	.....	......	......	..	......	..	....	51.4	......	80.0	31	65.2	29.0	2	37.6	27.6	42.5	14	11.5	1	....	......	1.93	+ 0.71	......	s.	...	......	..	7	..	..	..
Willcox	......	......	.....	......	......	..	......	..	....	39.0	......	78.8	31	63.3	*17.0	2	*28.8	61.8	†	2	‡	27	....	......	1.13	+ 0.27	......	w.	...	......	..	8	..	..	..
Yuma	141	29.82	−.02	29.97	30.28	11	29.74	24	0.54	62.5	− 1.5	86.8	13	75.6	37.0	4	47.1	49.8	40.0	30	15.0	26	47.6	39.7	0.05	− 0.15	5,648	s.	46	s.	8	1	1	9	21
Keeler	3,622	26.26	.....	29.92	30.44	11	29.52	8	0.92	50.6	......	72.5	18	61.7	27.0	1	39.8	45.5	29.8	20	11.4	2	40.3	25.1	0.30	+ 0.06	6,211	s.	42	s.	31	4	1	13	17
Middle plateau.										39.8	− 1.2														1.59	+ 0.40									
Fort Bidwell	4,615	25.32	.....	30.04	30.48	11	29.64	8	0.84	36.6	......	65.7	22	48.7	5.5	9	25.4	60.2	37.0	27	12.9	5	80.4	30.7	3.28	+ 1.01	5,343	w.	40	sw.	31	11	14	7	10
Winnemucca	4,344	29.60	−.02	30.02	30.51	11	29.57	8	0.94	39.1	− 1.9	70.7	22	53.2	10.0	1	26.1	60.7	49.5	22	10.6	31	....	......	0.21	− 0.54	§4,773	w.	66	w.	31	4	4	14	13
Salt Lake City	4,348	25.57	−.05	29.98	30.58	11	29.54	8	1.04	40.4	− 0.6	68.5	31	48.8	19.0	10	31.1	49.5	33.2	22	6.8	8	60.9	26.9	2.18	+ 0.20	4,736	se.	36	ne.	3	10	11	12	8
Montrose	5,780	24.21	.....	29.94	30.62	11	29.42	25	1.20	37.3	......	66.0	31	50.1	6.9	27	23.7	59.1	37.8	12	10.8	1	57.7	22.3	0.60	+ 0.12	4,419	se.	35	se.	25	8	11	10	10
Fort Bridger	6,643	23.40	.....	30.00	30.66	11	29.50	8	1.16	28.5	......	57.0	31	39.5	− 2.4	2	17.6	59.4	35.7	13	11.0	8	62.1	16.3	1.66	+ 1.19	7,986	w.	58	w.	28	12	14	15	2
Carson City	......	......	.....	......	......	..	......	..	....	41.9	......	66.4	12	53.4	16.6	12	29.0	49.8	40.2	12	11.3	14	44.6	19.8	0.50	....	......	......	...	......	..	5	2	10	19
Fort DuChesne	......	24.96	.....	......	......	..	......	..	0.89	35.2	......	68.8	31	49.8	10.0	28	20.4	58.8	45.5	28	12.5	26	73.8	26.7	0.22	....	2,337	w.	39	......	9	7	6	15	10
Northern plateau.										41.9	− 0.4														1.38	− 0.03									
Boisé City	2,750	27.13	−.05	30.00	30.47	11	29.59	7	0.88	42.7	+ 0.7	66.0	22	53.7	17.7	9	30.9	48.3	33.4	24	11.6	4	60.1	28.3	0.51	− 0.75	4,462	se.	32	w.	31	7	12	12	7
Ashland	......	......	.....	......	......	..	......	..	....	45.4	......	75.0	21	58.2	21.0	9	32.5	54.0	43.0	21	10.0	4	....	......	1.75	+ 0.36	......	n.	...	......	..	11	..	..	..
Fort Klamath	......	......	.....	......	......	..	......	..	....	34.0	......	66.0	22	45.4	− 3.0	9	22.6	63.0	38.0	9	9.0	7	....	......	2.01	+ 0.54	......	w.	...	......	..	10	..	..	..
Lakeview	......	......	.....	......	......	..	......	..	....	36.8	......	66.0	21	47.7	1.5	9	25.8	65.5	37.0	21	12.0	7	....	......	1.91	+ 0.33	......	......	...	......	..	11	..	..	..
Linkville	......	......	.....	......	......	..	......	..	....	38.3	......	65.0	22	49.0	7.1	9	27.6	57.9	37.0	27	8.3	4	....	......	1.39	− 0.05	......	nw.	...	......	..	8	..	..	..
Spokane Falls	1,909	27.94	−.02	29.99	30.35	21	29.54	28	0.81	38.4	− 1.6	62.1	22	49.0	11.9	9	28.2	50.2	35.2	22	6.9	6	69.4	28.1	0.62	− 0.62	4,127	sw.	24	sw.	28	10	13	13	5
Walla Walla	1,018	28.91	−.03	30.02	30.37	21	29.64	31	0.73	44.7	− 0.3	71.0	12	54.2	12.0	9	34.9	59.0	30.1	22	6.0	7	57.2	28.7	1.44	0.00	5,154	sw.	38	sw.	28	11	12	13	6
N. Pac. coast region.										44.5	0.0														4.56	− 0.52									
Fort Canby	179	29.80	+.02	30.00	30.42	14	29.46	31	0.96	43.9	− 0.1	56.9	21	48.5	31.8	9	40.0	25.1	19.6	21	3.3	27	84.5	39.2	6.58	+ 0.15	10,773	se.	63	s.	31	17	12	13	6
Neah Bay	......	......	.....	......	......	..	......	..	....	42.8	......	59.0	6	50.6	24.0	9	35.0	42.8	51.2	12	33.0	8	....	......	11.37	....	......	e.	...	......	..	14	..	..	..
Olympia	36	29.98	+.01	30.03	30.40	14	29.58	4	0.82	43.7	− 0.3	64.8	16	51.5	23.0	8	36.1	41.8	28.5	22	6.5	13	81.9	38.1	5.96	+ 0.57	3,052	s.	18	s.	18	16	17	9	5
Port Angeles	14	29.98	+.01	30.00	30.38	14	29.56	31	0.82	40.7	− 0.3	53.3	26	47.5	22.8	9	33.3	30.5	24.7	26	3.8	3	80.4	34.7	2.89	+ 0.89	3,469	s.	32	w.	17	12	14	10	7
Pysht	......	......	.....	......	......	..	......	..	....	40.6	......	59.0	27	47.0	22.0	9	34.2	37.0	25.0	27	5.0	31	....	......	10.55	....	......	e.	...	......	..	17	..	..	..
Astoria	......	29.97	.....	29.99	30.38	14	29.46	31	0.92	45.3	+ 1.3	64.0	25	53.2	28.0	9	38.9	36.0	28.0	26	7.0	2	85.2	40.8	6.64	− 0.21	4,513	sw.	36	sw.	11	20	18	9	4
Portland	80	29.95	.00	30.04	30.42	14	29.61	31	0.81	46.2	− 0.8	67.5	21	55.7	24.5	9	36.4	43.0	31.1	22	11.0	28	77.1	38.6	2.87	− 3.60	3,739	nw.	40	s.	31	14	12	16	3
Roseburg	523	29.47	−.04	30.03	30.37	14	29.54	4	0.83	47.2	+ 0.2	71.2	16	58.1	23.0	9	35.7	48.2	37.9	16	7.0	5	71.9	37.7	2.39	− 0.94	3,111	nw.	25	se.	31	9	14	10	7
Mid. Pac. coast reg.										52.1	− 0.9														3.37	+ 0.47									
Eureka	......	29.98	.....	30.03	30.37	11	29.61	1	0.76	47.7	− 1.3	67.8	12	54.3	32.5	9	41.9	35.3	24.2	11	4.2	23	79.1	41.1	4.09	....	7,027	n.	36	n.	19	13	14	7	10
Red Bluff	342	29.66	−.02	30.01	30.48	11	29.66	8	0.82	54.5	− 0.5	77.5	20	63.8	32.0	4	43.4	45.5	30.4	27	6.7	30	54.2	34.4	3.47	+ 0.74	7,644	n.	40	s.	31	12	7	10	14
Sacramento	64	29.94	−.05	30.01	30.48	11	29.64	8	0.84	53.6	− 1.4	76.5	17	62.7	37.0	1	44.5	39.5	28.3	20	7.5	4	67.7	42.0	3.04	0.00	6,736	nw.	48	se.	4	8	6	8	17
San Francisco	60	29.97	−.05	30.04	30.47	11	29.64	8	0.83	52.5	− 0.5	73.7	19	60.2	38.0	4	46.7	35.7	24.1	19	5.6	1	72.9	42.8	3.60	+ 0.68	6,085	w.	30	se.	4	11	9	9	13
S. Pac. coast region.										55.4	− 0.6														2.98	+ 0.94									
Fresno	313	29.69	.....	30.03	30.45	11	29.60	8	0.85	54.1	......	77.1	21	65.5	28.1	1	41.6	49.0	35.4	30	10.9	8	74.6	45.3	1.95	....	3,590	nw.	24	se.	1	8	3	10	18
Los Angeles	339	29.67	−.02	30.03	30.33	11	29.66	8	0.67	55.1	− 0.9	79.0	12	64.8	35.9	1	46.5	43.1	30.0	12	8.3	4	77.6	47.4	3.17	+ 0.48	4,621	w.	30	e.	8	11	9	12	10
San Diego	67	29.98	−.02	30.05	30.29	10	29.77	8	0.52	55.8	− 0.2	72.0	12	62.2	41.0	1	48.8	31.0	26.0	12	9.0	18	81.4	50.0	2.79	+ 1.39	4,312	w.	21	sw.	2	10	12	10	9

NOTE.—The data at Pike's Peak, Colo., and stations having no departures are not used in computing the district averages. * Record for 16 days; † 46.0, record for 16 days; ‡ 13.3, record for 16 days; § record for 18 days.

Meteorological record of voluntary observers and Army post surgeons, March, 1888.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Alabama.	°	°	°	*Inches*
Livingston	81	32	53.4	10.99
Mt. Vernon B'ks	82	31	60.1	11.67
Newmarket	74	30	48.7	10.75
Arizona.				
Huachuca, Fort	75	24	.....	0.96
McDowell, Fort	87	29	55.6	0.25
Mojave, Fort	86	37	60.8	1.65
Arkansas.				
Eureka Springs	82	15	45.1	2.38
Hot Springs	.....	24	48.8	4.88
Lead Hill	90	18	46.2	3.95
British Columbia.				
New Westminster	54	35	40.6	6.75
California.				
Alcatras Island	75	41	51.3	4.16
Banning	76	32	.....	0.93
Bidwell, Fort	66	8	.....	2.32
E. Pasadena	78	36	55.4	4.68
Gaston, Fort	82	22	49.0	4.64
Georgetown	71	24	46.8	5.47
Hydesville	.....	28	.....	3.45
Lewis Creek*	74	34	54.0	2.29
Nicolaus *	81	35	56.5	2.83
Oakland	71	38	52.2	4.44
Oroville	78	40	56.3	3.44
Presidio of San F	73	35	51.2	3.46
Riverside	76	32	53.4	3.51
Sacramento	74	30	50.7	3.80
Salinas	70	30	50.2	3.28
Santa Barbara	75	38	53.0	3.86
Willows	78	32	53.1	1.69
Colorado.				
Grand Junction*	72	12	39.3	0.87
Lewis, Fort	.....	−10	28.9	1.40
Connecticut.				
Hartford	53	0	34.2	5.09
New Hartford	48	− 2	23.2	2.97
Southington	56	3	29.2	7.40
Voluntown	54	10	30.4	8.45
Dakota.				
A. Lincoln, Fort	47	−21	13.4	0.50
Garden City	40	−13	16.0	1.79
Highmore	57	−17	18.7	.....
Meade, Fort	57	−17	22.1	0.75
Parkston	63	−12	23.3	1.55
Pembina, Fort	42	−30	.....	0.98
Randall, Fort	59	−17	27.5	0.92
Richardton	48	−27	.....	2.00
Sisseton, Fort	42	−15	13.3	0.59
Sully, Fort	66	−13	20.7	0.47
Totten, Fort	.....	−21	9.2	1.37
Webster	50	−20	19.4	1.93
Yates, Fort	53	−28	.....	0.40
District of Columbia.				
Distribut'g res'v'r*	72	13	36.8	4.96
Receiving res'v'r*	.....	8	37.7	5.13
Aqueduct office*	79	11	42.1	.....
Florida.				
Alva*	86	40	64.0	1.10
Archer	90	32	63.5	1.34
Duke	87	39	59.3	1.52
Fort Meade*	88	38	6.3	2.32
Homeland *	87	40	.....	2.70
Limona*	89	43	67.6	3.19
Manatee	90	42	65.7	3.01
Merritt's Island	84	44	65.0	1.46
St. Francis Bar'cks.	85	38	60.1	1.35
Tallahassee	83	31	60.1	5.45
Georgia.				
Athens	80	22	49.8	6.64
Forsyth *	82	32	55.9	11.50
Milledgeville *	78	28	5.3	10.80
Quitman	78	55	59.2	4.75
Idaho.				
Boisé Barracks	68	14	41.4	0.16
Sherman, Fort	60	6	.....	1.80
Illinois.				
Charleston *	70	8	35.2	3.12
Mattoon	71	8	35.0	3.20
Palestine	73	12	33.3	4.72
Pekin	67	5	35.1	5.29
Rockford	51	− 3	27.1	3.03
Sandwich *	58	1	32.2	3.20
Sycamore	52	0	27.9	2.59
Windsor	68	8	36.2	3.37
Indiana.				
Butlerville*	72	9	37.8	4.46
Degonia Springs	68	18	.....	1.28
Jeffersonville	71	16	41.1	5.60
Laconia	75	14	40.6	5.73
Lafayette	66	30	33.5	1.78
La Grange	69	2	28.8	2.25
Logansport *	72	2	34.8	3.08
Mauzy	66	5	32.1	4.57
Mount Vernon	71	18	42.6	6.80
Princetown	68	15	44.3	5.80
Sunman *	69	8	36.8	4.93
Vevay	74	14	39.8	4.23

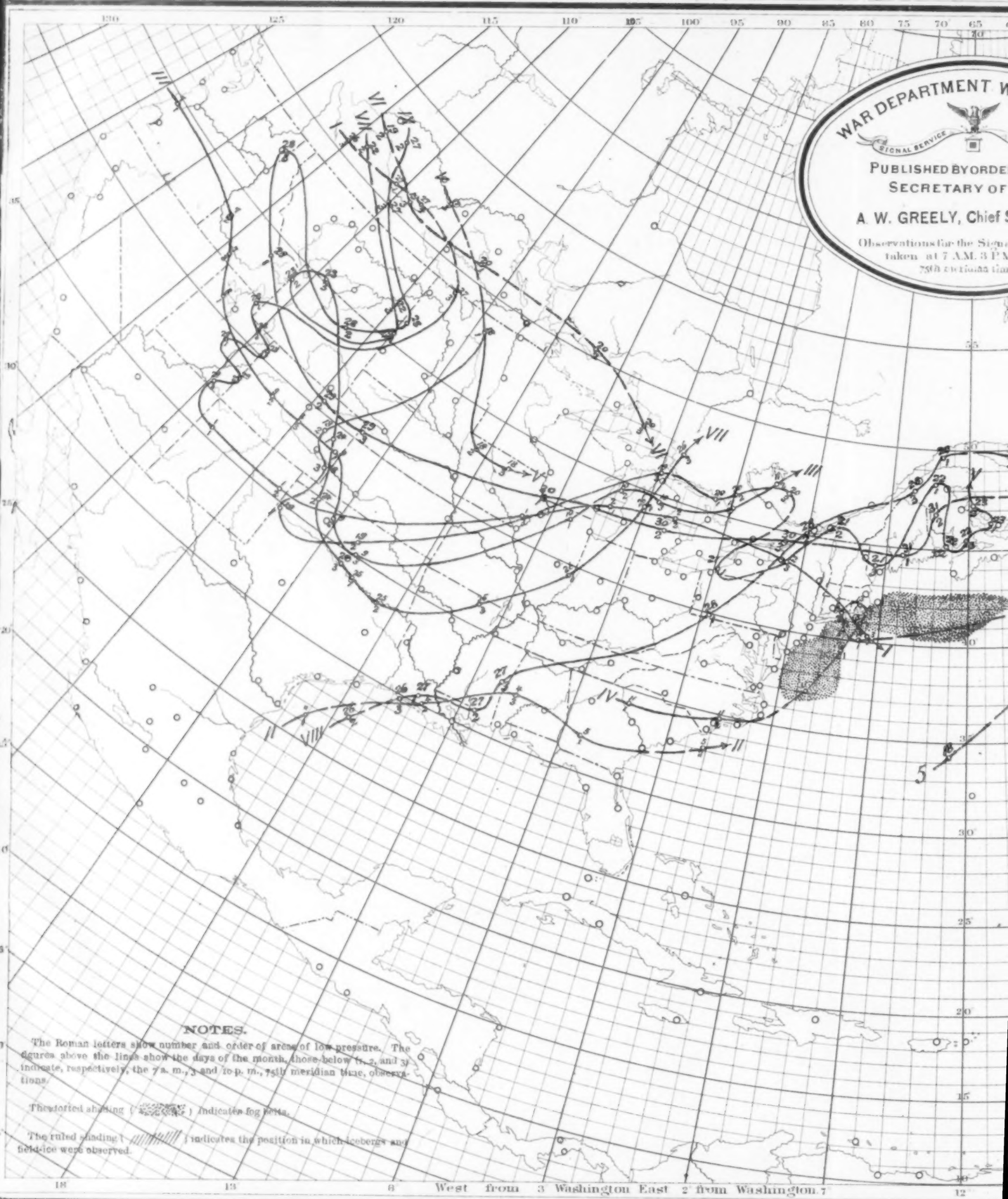
Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Indian Territory.	°	°	°	*Inches*
Gibson, Fort	81	12	46.9	0.86
Reno, Fort	88	13	43.9	1.30
Supply, Fort	85	.....	.....	0.18
Iowa.				
Ames	65	− 4	23.4	2.86
Auburn	67	− 7	29.6	2.92
Bancroft	59	−10	21.1	2.35
Cedar Rapids b	65	− 4	27.8	3.52
Clear Lake	49	− 8	21.6	4.23
Clinton	58	− 2	28.6	3.43
Clarinda	70	4	30.7	2.85
Cresco	43	−10	19.6	4.55
Cromwell	.....	.....	.....	3.48
Des Moines	72	− 9	30.8	.....
Denmark	.....	.....	.....	3.87
Dysart	51	− 8	.....	4.20
Fort Madison	62	5	.....	3.45
Glenwood a	78	− 8	29.9	2.76
Independence *	52	− 2	25.2	5.08
Logan *	74	−12	29.0	3.40
Manson	64	− 6	24.4	1.85
Maquoketa	.....	.....	.....	2.57
Monticello	55	− 4	26.5	3.71
Mount Vernon*	55	− 5	28.4	.....
Muscatine	67	0	30.6	3.10
Osceola	68	− 5	24.2	3.42
Oskaloosa a	70	5	30.0	.....
Sac City	68	−10	23.7	3.35
Webster	66	− 8	26.1	3.06
West Bend	68	− 8	22.1	3.90
Kansas.				
Cawker City	82	2	33.8	1.66
East Norway	75	11	38.0	2.10
Emporia	76	.....	38.8	2.47
Gibson	78	− 4	33.5	0.70
Globe	77	12	30.9	3.73
Hays, Fort	76	2	34.9	2.25
Independence	87	−15	42.6	2.09
Lawrence	78	14	38.6	5.47
Lebo	85	10	38.1	2.69
Manhattan b	80	2	35.2	1.75
Morse*	72	12	28.0	6.35
Ninnescah	73	2	36.6	1.44
Riley, Fort	79	6	37.9	1.62
Rome	74	16	40.0	2.54
Salina *	62	14	36.4	0.24
Sedan	86	16	42.7	2.33
Tribune	74	− 6	32.5	4.92
Wakefield*	72	2	36.8	2.79
Washburn College	82	8	37.5	3.21
Wellington	80	14	42.0	1.24
Wilson	81	2	34.4	2.01
Kentucky.				
Bowling Green*	84	19	.....	5.77
Carlisle	73	10	.....	4.74
Frankfort	75	15	.....	5.05
Shelbyville	72	20	48.7	2.95
Louisiana.				
Grand Coteau	79	37	59.6	5.91
Liberty Hill	86	26	66.5?	6.43
Luling	78	35	.....	5.15
Port Eads	78	44	.....	2.00
Maine.				
Bar Harbor	47	− 1	.....	4.02
Cornish	46	5	27.2	.....
Gardiner	49	0	28.9	5.09
Orono	48	2	28.0	6.48
Kent's Hill	44	6	27.7	.....
Maryland.				
Cumberland	68	10	35.7	3.15
Great Falls *	71	12	37.5	3.72
McDonogh	67	10	34.6	4.66
McHenry, Fort	71	10	37.0	5.56
Mount St. Mary's	70	10	36.3	2.00
Woodstock	70	− 4	35.0	4.58
Massachusetts.				
Amherst a	49	− 3	26.8	5.96
Amherst b	50	2	28.7	6.23
Blue Hill Observ'y	54	8	28.2	6.02
Deerfield	51	− 3	27.0	6.22
Dudley	43	13	27.9	6.77
Fall River	52	10	30.9	8.55
Milton	.....	.....	31.8	6.13
Newburyport	54	11	31.2	6.25
Provincetown	.....	.....	32.5	3.61
Somerset	56	7	32.4	6.49
Taunton	55	11	32.0	4.12
Westborough*	56	7	32.9	5.77
Williamstown	50	− 7	24.5	7.89
Worcester	52	8	27.8	8.37
Mexico.				
Leon de Aldamas	87	44	64.3	0.01
Michigan.				
Adrian	71	− 7	28.5	2.98
Benton Harbor	64	5	25.9	3.06
Birmingham	56	−11	26.9	2.92
Brady, Fort	37	−23	.....	1.93

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Michigan—Con'd.	°	°	°	*Inches*
Greenville	66	0	25.4	3.32
Hanover	66	3	28.4	1.96
Hudson	68	− 4	.....	1.46
Hastings	66	4	27.1	2.68
Kalamazoo a	63	8	27.8	2.22
Lansing	68	0	24.5	2.02
Mottville*	69	4	28.2	1.90
Saint Louis	66	0	25.2	3.11
Swarts Creek	69	0	26.6	1.60
Thornville*	66	− 7	26.8	2.12
Traverse City	59	−17	.....	4.33
Minnesota.				
Minneapolis	42	−13	17.8	2.46
Snelling, Fort	44	−16	17.5	1.72
Mississippi.				
Biloxi	72	37	58.4	7.25
Palo Alto	78	30	52.9	10.61
Missouri.				
Conception	75	1	.....	1.82
Fayette	79	12	39.7	6.10
Frankford	60	5	30.6	3.64
Montana.				
Keogh, Fort	56	−38	.....	0.31
Missoula, Fort	.....	.....	.....	0.20
Shaw, Fort	66	−29	23.6	.....
Virginia City	54	−14	.....	.....
Nebraska.				
Brownville*	80	1	40.1	2.59
De Soto*	76	− 1	27.8	4.77
Fairbury	60	0	.....	3.25
Fremont*	76	−11	27.8	2.00
Genoa	73	−15	24.6	2.25
Hay Springs	69	−14	25.3	0.94
Lincoln	79	−11	31.4	3.03
Marquette	75	− 4	.....	2.37
Niobrara, Fort	71	−10	25.6	0.66
Robinson, Fort	.....	−10	23.1	0.60
Sidney, Fort	73	− 9	.....	0.30
Tecumseh	75	7	31.8	2.41
Weeping Water	75	−15	28.5	3.61
Nevada.				
McDermit, Fort	65	10	37.9	3.32
New Hampshire.				
Berlin Mills	.....	.....	.....	4.19
Concord	56	2	28.8	4.92
Nashua	52	1	29.4	5.06
New Jersey.				
Beverly	69	7	33.9	5.15
Clayton *	71	8	37.7	5.29
Egg Harbor City	68	4	34.8	5.98
Moorestown	68	7	32.9	5.39
Readington *	72	6	35.8	.....
South Orange	62	4	30.6	8.20
Vineland	69	8	41.0	7.41
New Mexico.				
Bayard, Fort	.....	.....	45.0	0.90
Gallinas Spring	74	24	.....	5.43?
Las Vegas	69	3	39.7	0.55
Selden, Fort	78	22	53.9	0.82
Union, Fort	66	14	38.0	2.05
Wingate, Fort	.....	8	.....	1.68
New York.				
Ardenia	54	5	31.0	4.96
Auburn	65	3	27.9	3.13
Brooklyn	62	4	32.6	5.16
Columbus, Fort	64	6	31.5	6.28
Cooperstown	56	− 9	22.3	3.34
Factoryville	62	− 1	25.9	2.14
Friendship	.....	.....	27.0	1.81
Humphrey	56	− 5	24.0	1.80
Ithaca	60	− 2	26.3	1.97
Le Roy	60	− 1	25.4	1.41
Madison Barracks	58	− 7	.....	0.90
Menands	46	1	25.6	5.75
Niagara, Fort	62	2	25.0	.....
North Volney	49	− 9	23.1	.....
Palermo *	56	−11	22.6	1.89
Plattsburg B'ks	45	0	23.8	1.95
Rose	51	2	25.1	1.64
Setauket	53	9	30.6	7.38
Syracuse	60	− 2	.....	.....
West Point	53	0	.....	.....
White Plains	53	5	31.2	3.67
North Carolina.				
Chapel Hill	78	20	47.3	8.73
Lenoir	.....	.....	.....	4.73
Raleigh	79	26	49.0	5.03
Statesville*	75	18	46.6	8.28
Weldon*	76	17	45.7	7.41
Ohio.				
Cleveland	68	8	31.6	3.19
College Hill*	70	12	39.4	3.69
Elyria	68	10	40.5	3.24
Garrettsville	68	4	29.1	2.74
Jacksonborough	70	2	33.9	5.35
Lordstown	66	8	30.5	1.43
Napoleon	69	7	30.3	2.95
North Lewisburg	70	8	35.2	5.90

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Ohio—Cont'd.	°	°	°	*Inches*
Portsmouth	77	2	39.6	4.67
Ruggles*	64	8	31.3	3.80
Tiffin*	70	9	33.3	4.26
Wauseon	71	− 0	29.7	3.64
Westerville	68	8	34.0	3.33
West Milton	70	10	37.0	8.50
Yellow Springs	68	7	35.7	4.07
Oregon.				
Albany	67	26	46.0	3.34
Bandon *	62	27	.....	7.23
East Portland*	62	20	.....	1.13
Eola	62	26	43.8	3.21
La Grande	64	6	39.3	1.16
Klamath, Fort	66	− 3	35.1	1.23
McMinnville	65	22	43.1	3.40
Yaquina Lt. House	61	29	43.5	7.76
Pennsylvania.				
Altoona	66	4	35.7	1.75
Blooming Grove*	59	− 2	.....	4.10
Catawissa	60	3	33.5	2.59
Corry *	68	−10	28.3	1.74
Dyberry	54	− 5	23.4	4.01
Franklin *	.....	.....	28.6	2.41
Germantown	65	4	.....	6.36
Grampian Hills	62	0	28.1	3.00
Meadville	64	8	33.2	.....
Phillipsburg	63	0	30.3	2.06
Quakertown	65	2	30.6	4.94
State College	58	− 2	30.5	2.90
Wellsborough *	56	− 2	27.6	3.60
West Chester	68	6	32.6	6.39
Westtown	66	8	34.5	3.13
South Carolina.				
Aiken	75	26	54.4	7.87
Cedar Springs	80	20	50.3	8.16
Kirkwood	66	22	47.7	6.83
Stateburg *	76	25	51.7	5.90
Tennessee.				
Ashwood	75	25	.....	7.43
Milan	79	23	47.0	5.28
Texas.				
Austin*	78	36	.....	2.49
Cedar Hill	80	29	54.0	5.00
Cleburne *	81	24	48.2	2.85
Comanche	80	26	.....	2.25
Colorado	88	24	.....	0.24
Concho, Fort	91	24	51.8	0.92
Decatur	86	26	49.5	3.59
McIntosh, Fort	82	41	62.3	1.11
Mesquite	84	27	51.4	4.06
New Ulm	80	34	57.3	2.72
Ringgold, Fort	91	37	65.2	1.71
Silver Falls	87	22	48.8	0.93
Vermont.				
Burlington	58	1	26.2	2.56
Brattleborough	52	0	28.6	7.46
Lunenburg	50	−10	22.5	4.80
Manchester	54	− 7	24.5	5.05
Newport*	50	− 8	25.4	.....
Stratford*	48	0	23.4	4.60
Virginia.				
Bird's Nest *	75	13	29.6	8.55
Christianburg	74	11	.....	3.25
Dale Enterprise*	70	10	41.3	4.38
Marion	68	10	39.4	3.51
Monroe, Fort	76	14	.....	4.37
Petersburg	66	19	51.9	8.58
Summit*	74	9	37.8	.....
University of Va	63	24	43.1	4.69
Variety Mills	76	16	40.5	4.77
Wytheville	66	12	49.4	2.73
Washington Territory.				
Blakely *	60	21	44.0	4.94
Spokane, Fort	66	15	.....	0.30
Townsend, Fort	59	26	43.9	2.45
Walla Walla, Fort	71	7	44.9	0.21
West Virginia.				
Clarksburg*	69	0	38.1	3.22
Helvetia *	70	10	37.7	4.38
Middlebrook*	60	0	30.7	.....
Parkersburg	74	− 4	37.8	2.30
Wisconsin.				
Beloit	54	− 2	26.1	2.83
Deuster	48	−10	.....	3.60
Delavan	57	− 1	24.8	1.70
Embarras *	42	− 7	20.1	3.55
Fond du Lac	49	− 3	22.7	3.23
Fredonia	50	− 4	21.9	.....
Manitowoc	45	− 5	24.4	3.69
Madison	45	− 5	23.2	2.61
Prairie du Chien	53	− 7	24.8	3.83
Wauconsta	42	− 8	.....	.....
Wyoming.				
Camp Sheridan	51	−13	21.9	3.12
Laramie, Fort	70	− 8	.....	0.52
McKinney, Fort	61	−15	23.2	0.78
Washakie, Fort	67	− 7	.....	0.69

Form 106 C 1884.

Chart I. Tracks of Areas of


WAR DEPARTMENT W
SIGNAL SERVICE
PUBLISHED BY ORDE
SECRETARY OF
A. W. GREELY, Chief S
Observations for the Signa
taken at 7 A.M. 3 P.M
75th meridian tim
NOTES.
The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 and 10 p. m., 75th meridian time, observations.
The dotted shading ( ) indicates fog belts.
The ruled shading ( ) indicates the position in which icebergs and field-ice were observed.
West from Washington
East from Washington

s of Low Pressure. March, 1888.

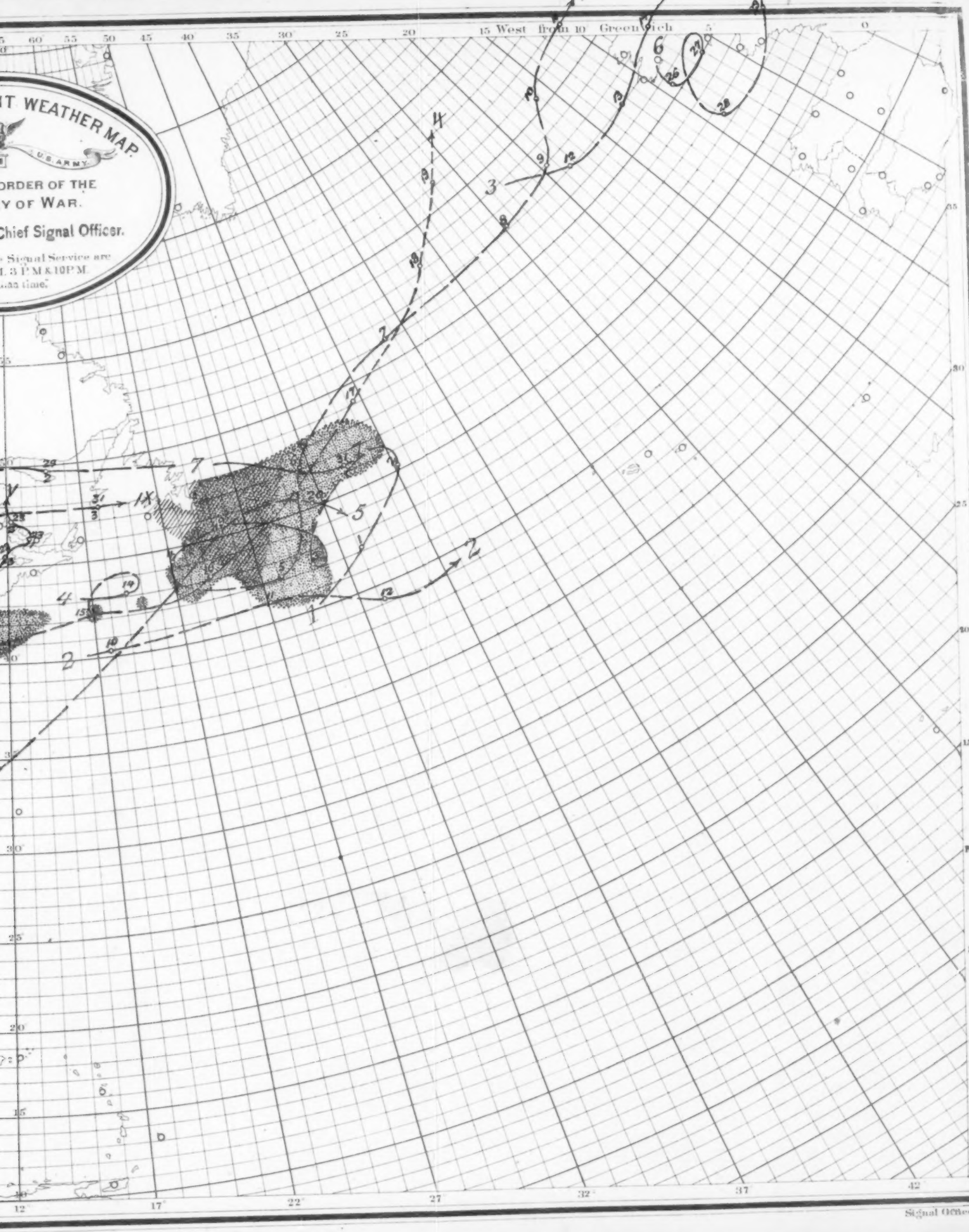
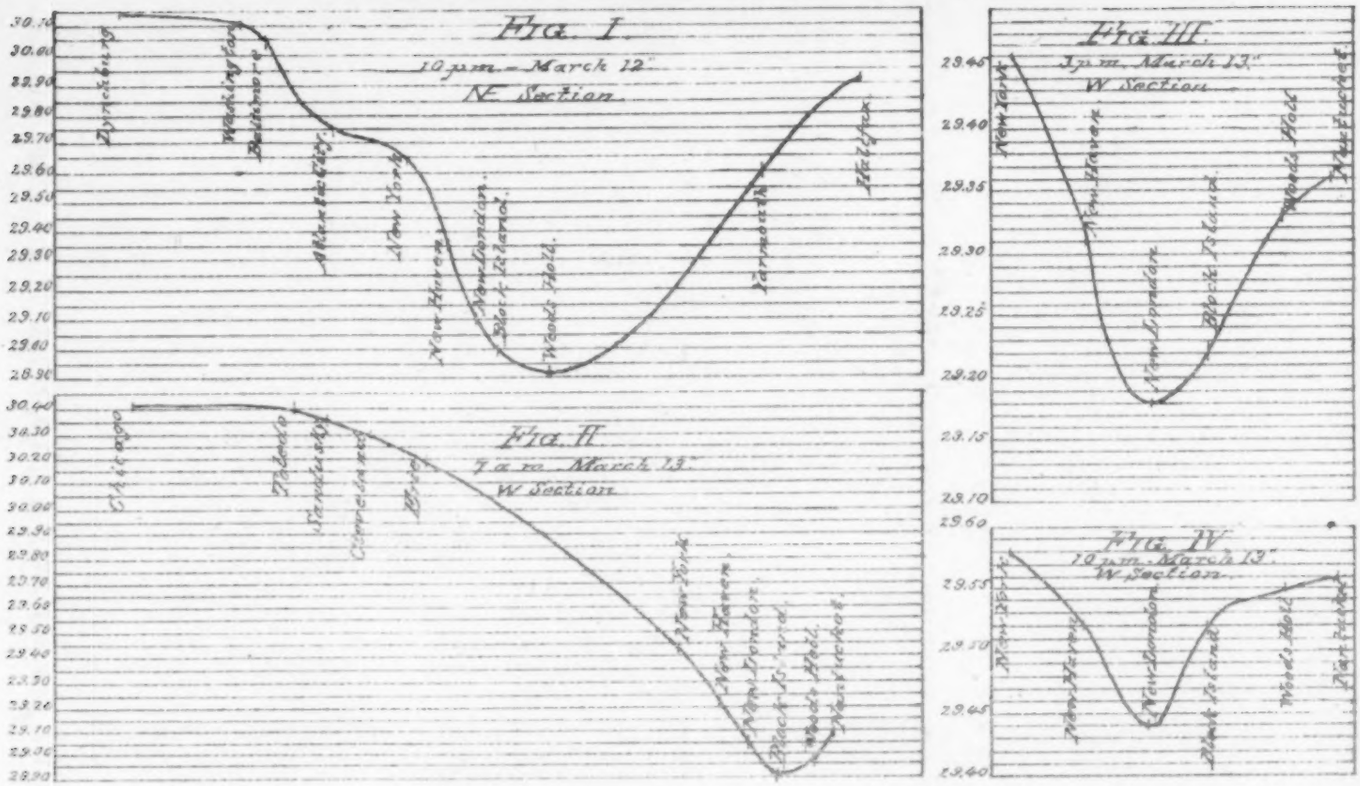


Chart III. Normal March temperatures for a number of years (——).

Mean temperature for March, 1888 (·····).

Figures I to 7. See description of storm of March 11-14.



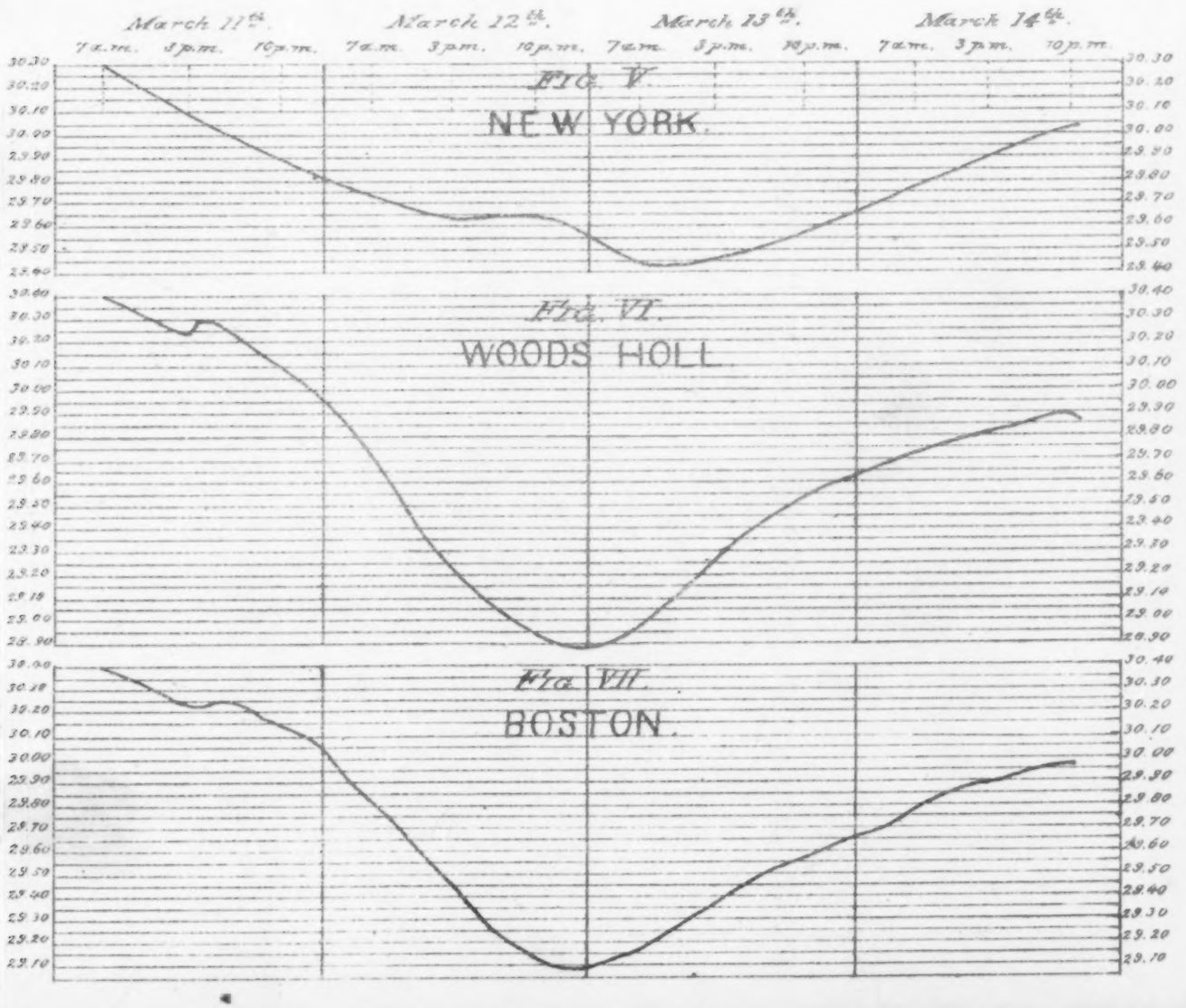


Chart II. Isobars, Isotherms, and Winds. March, 1888.

Chart II. Isobars, Isotherms, and Winds. March, 1888.

Form 106 F.

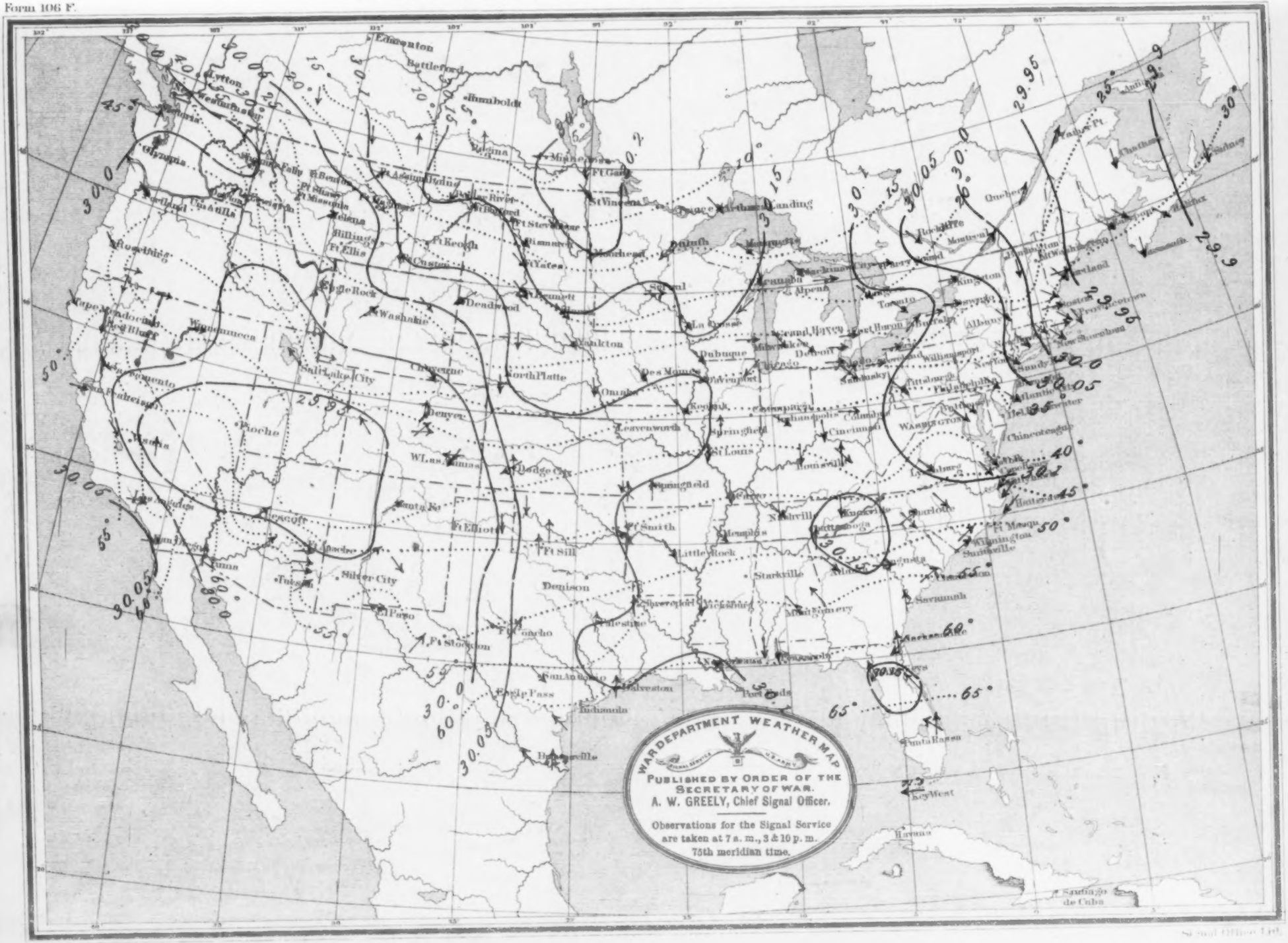
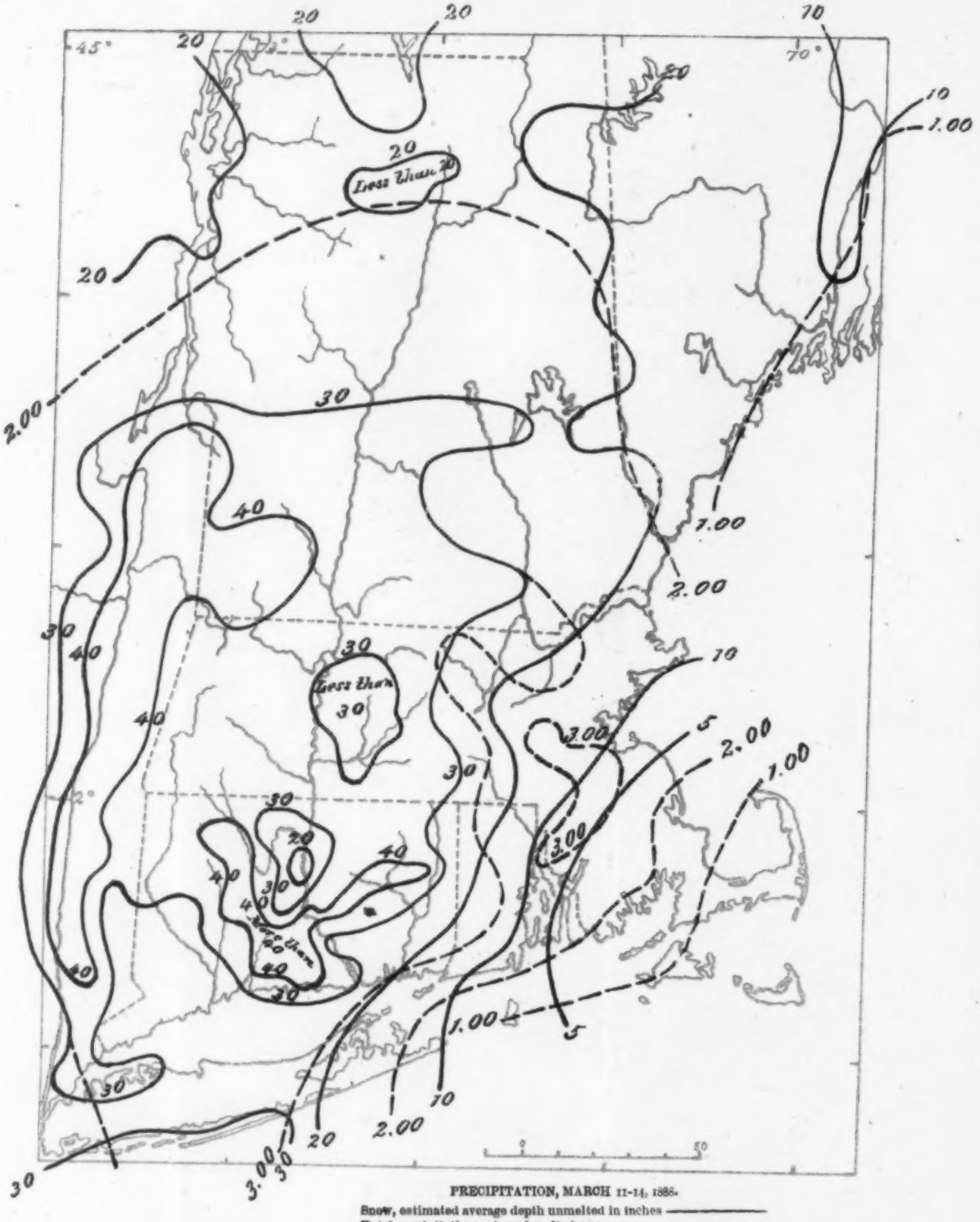

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m. 75th meridian time.

Chart V.



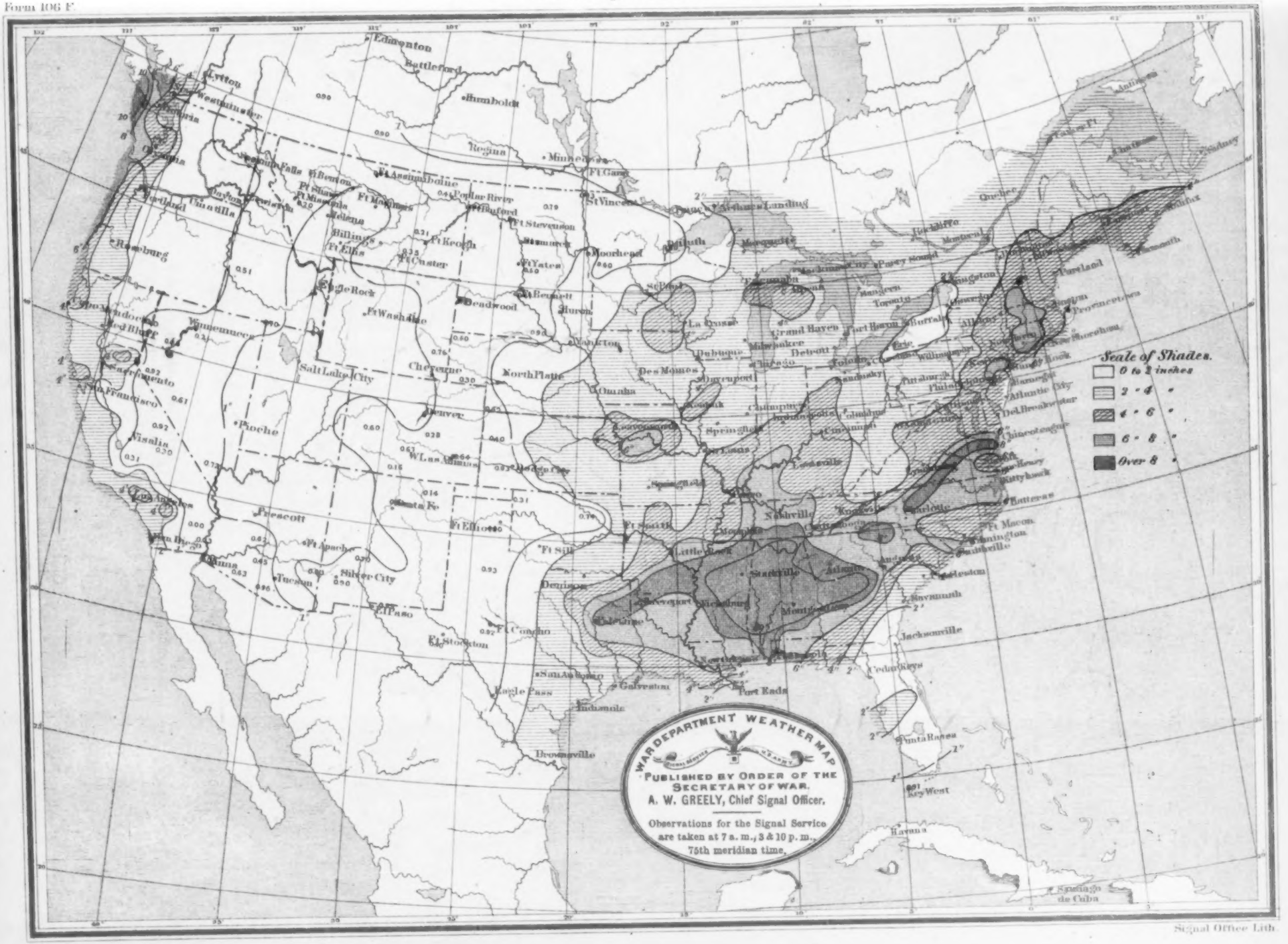
PRECIPITATION, MARCH 11-14, 1888.

Snow, estimated average depth unmelted in inches ————————

Total precipitation, rain and melted snow – – – – – –

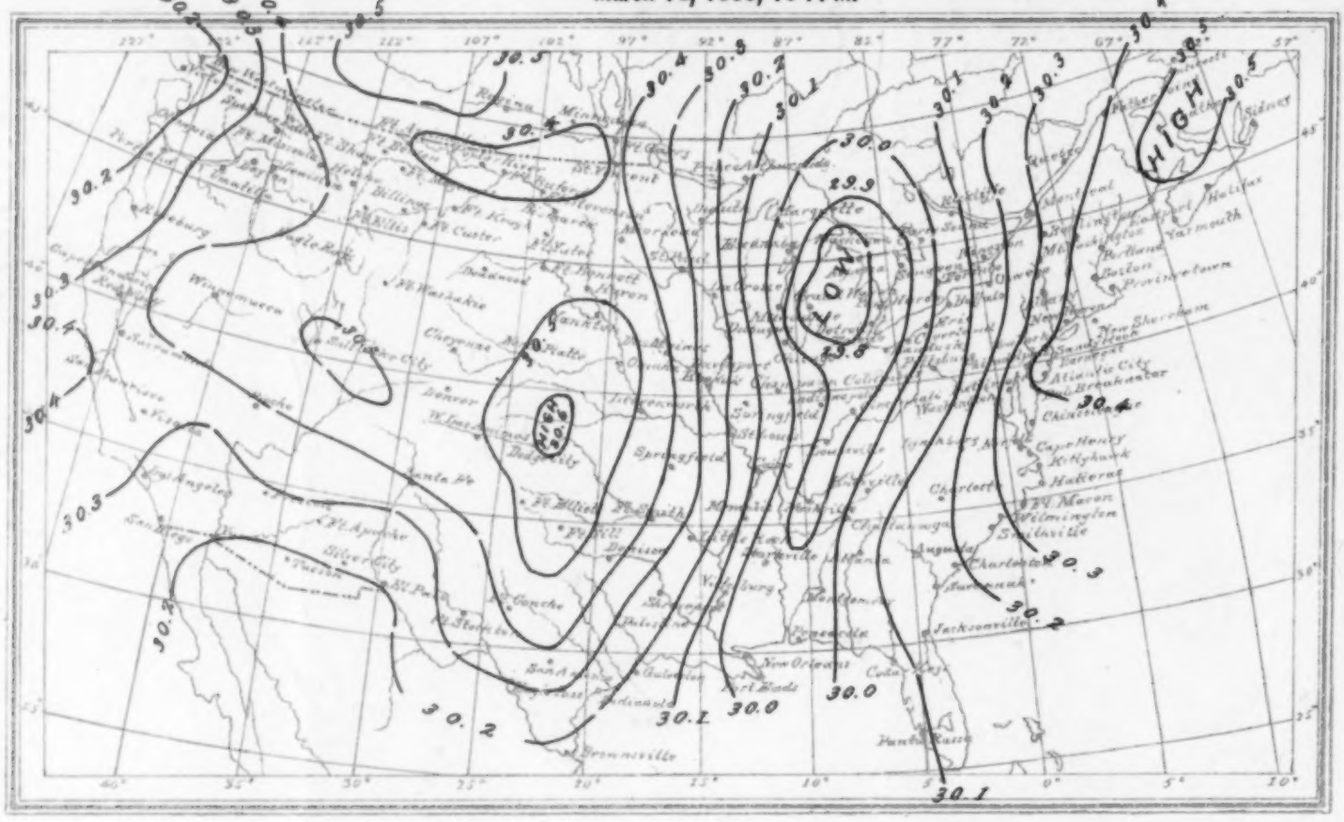
Form 106 F.

Chart IV. Precipitation, March, 1888.

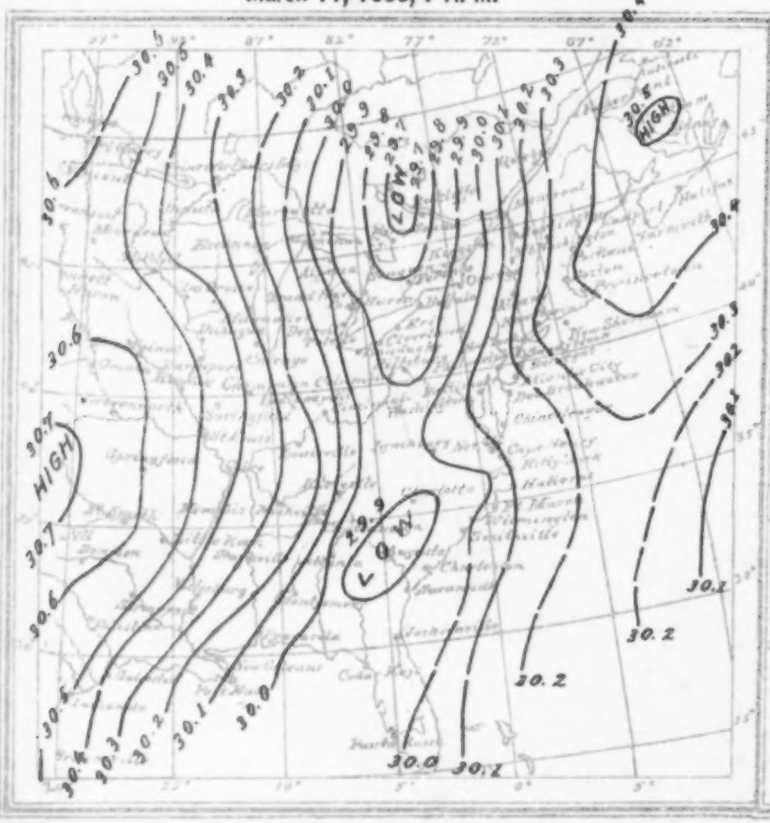

Scale of Shades.
0 to 2 inches
2 - 4 "
4 - 6 "
6 - 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

Signal Office Lith.

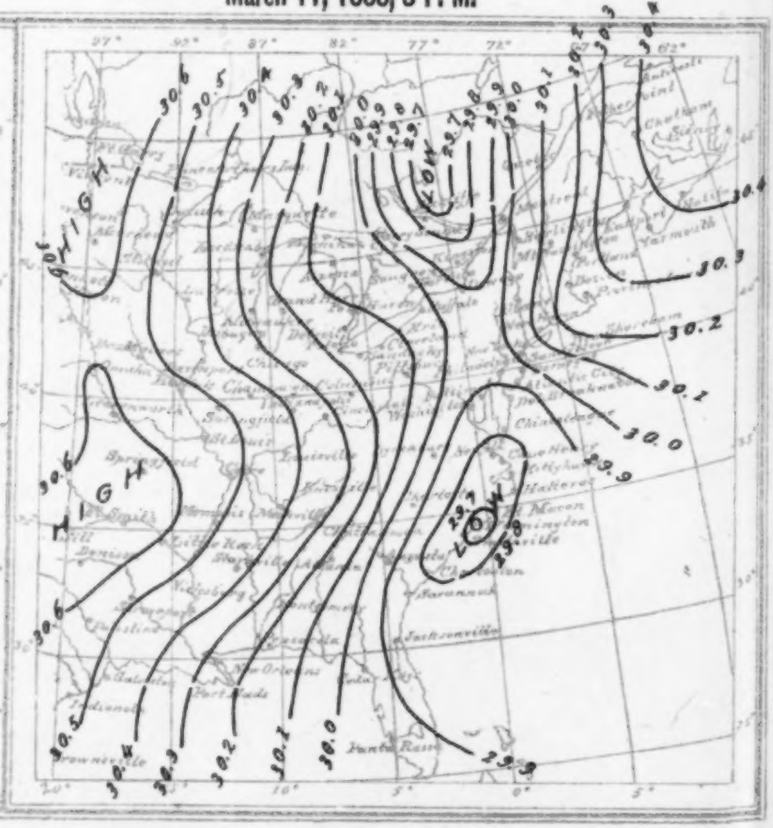
March 10, 1888, 10 P. M.



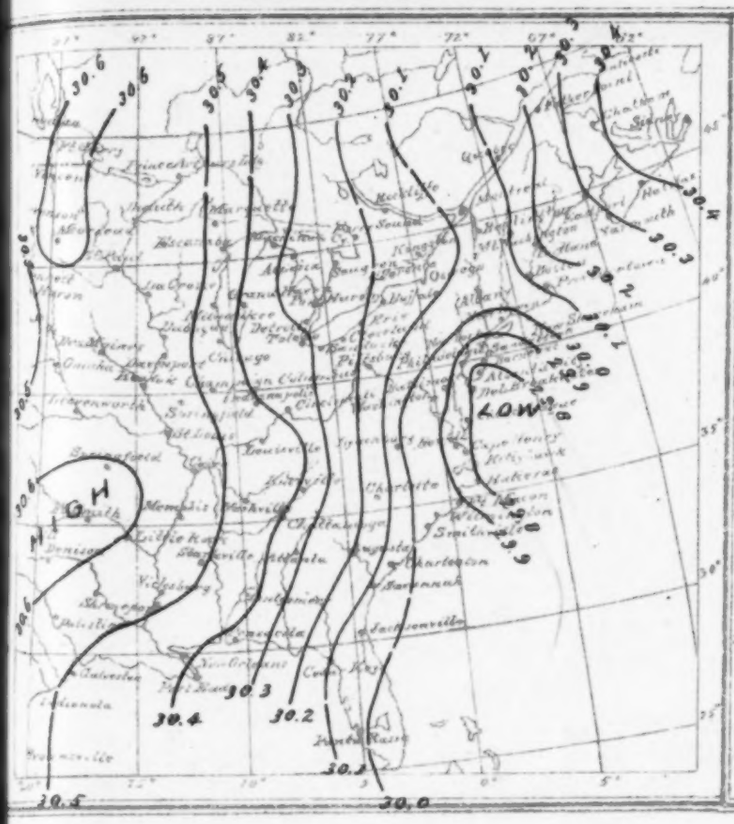
March 11, 1888, 7 A. M.



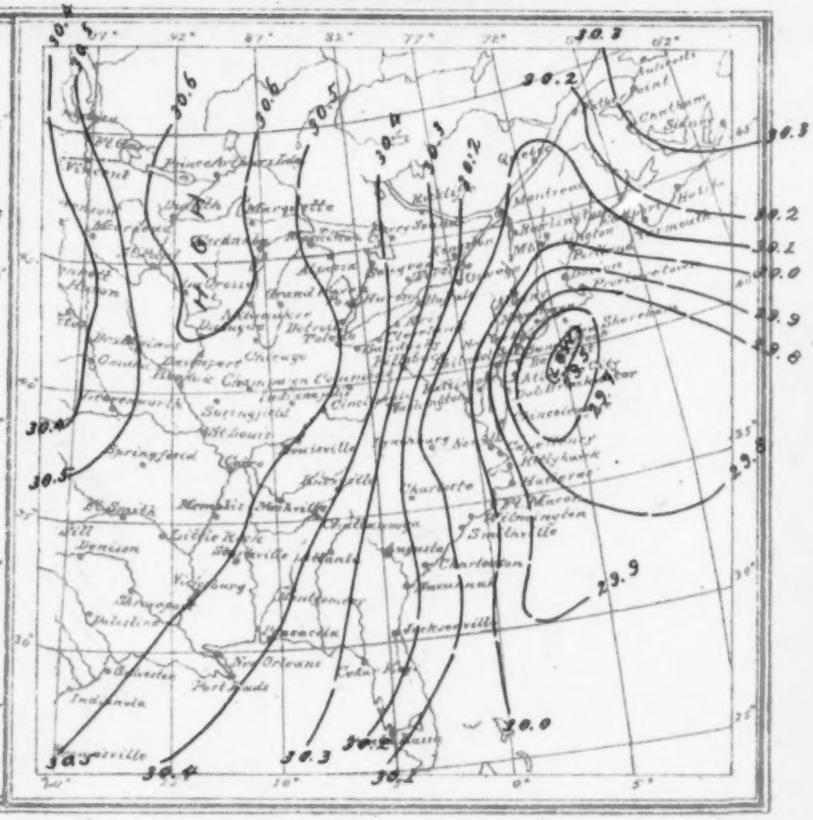
March 11, 1888, 3 P. M.



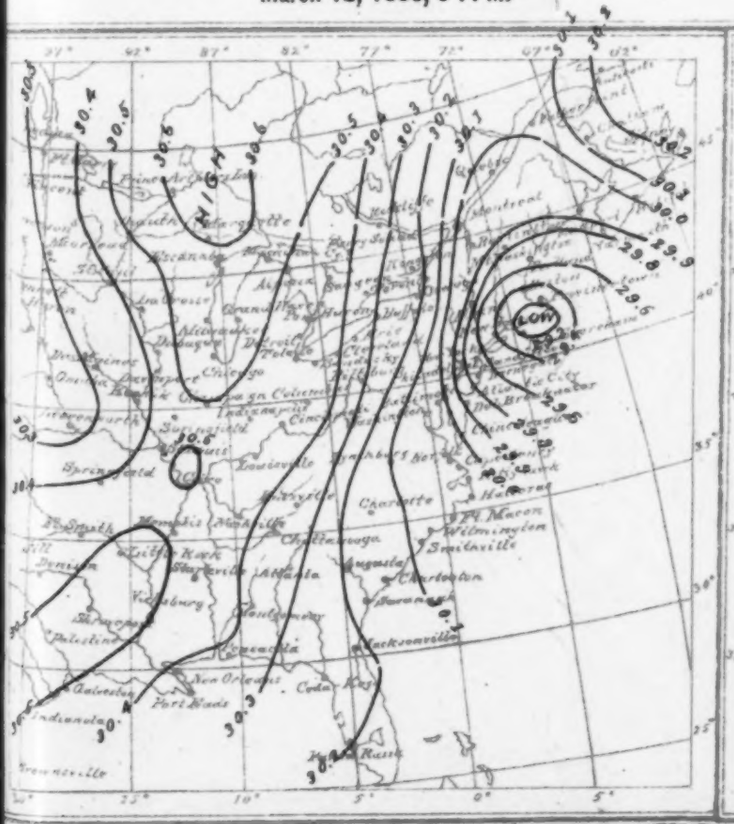
March 11, 1888, 10 P. M.



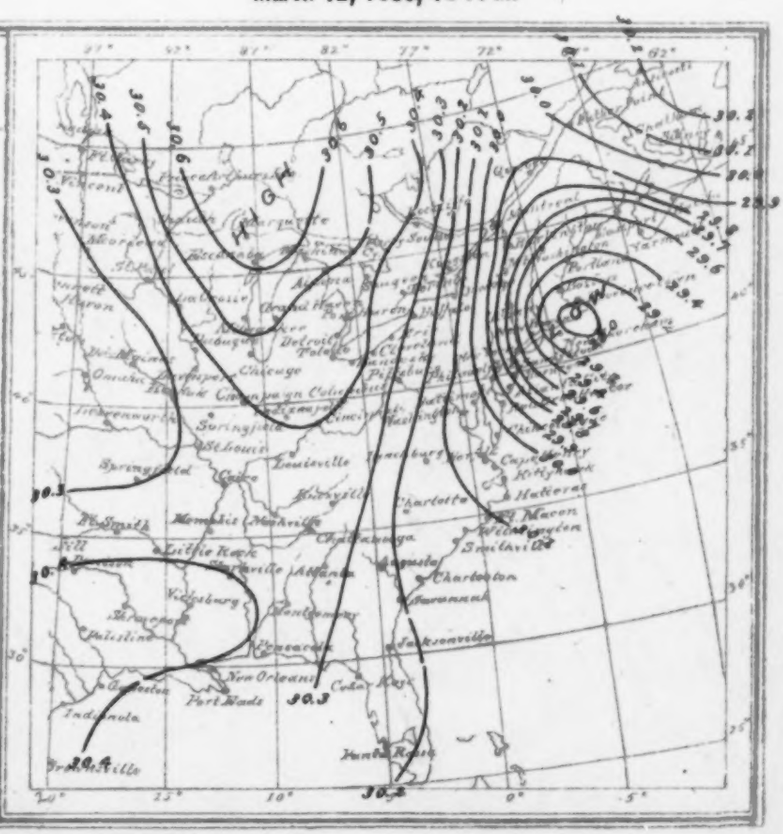
March 12, 1888, 7 A. M.



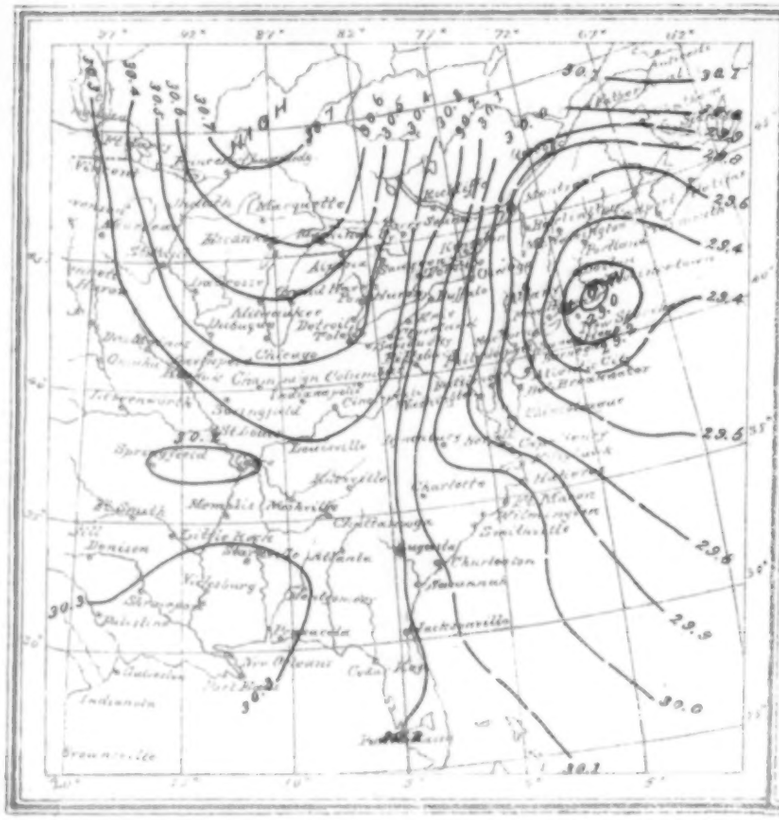
March 12, 1888, 3 P. M.



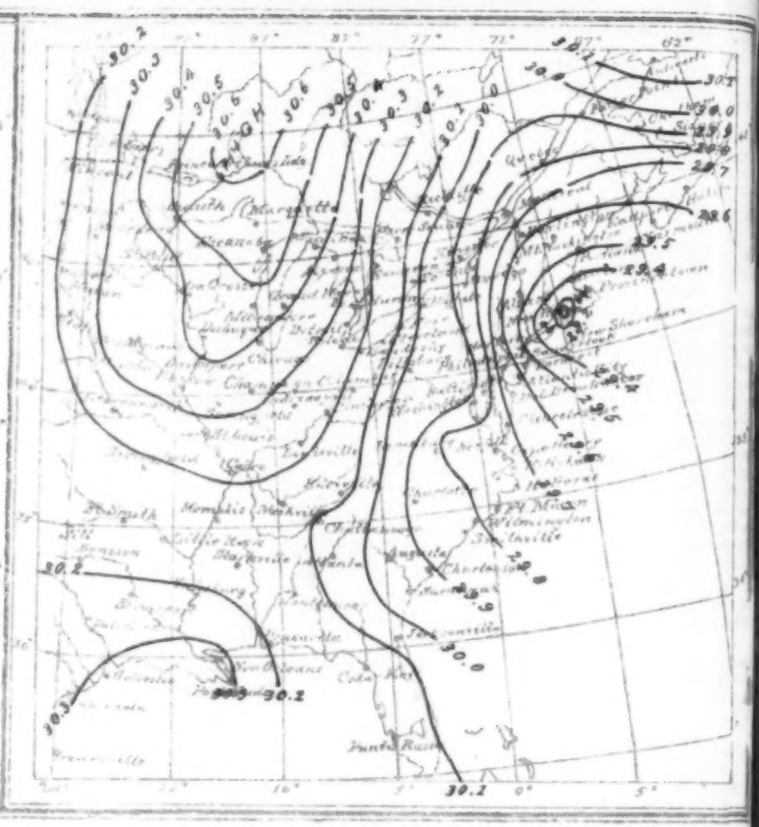
March 12, 1888, 10 P. M.



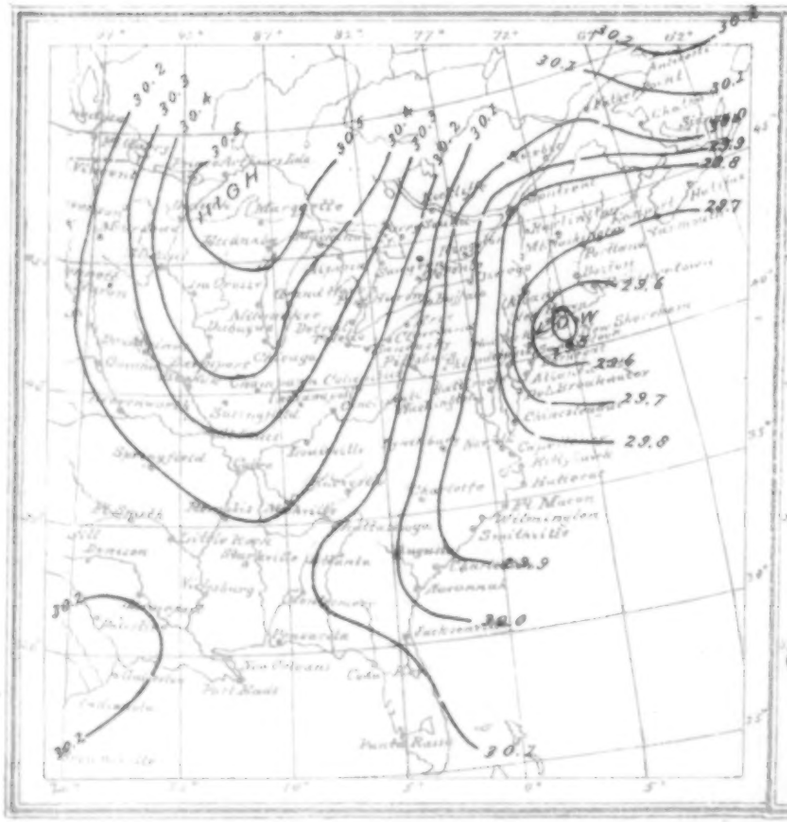
March 13, 1888, 7 A. M.



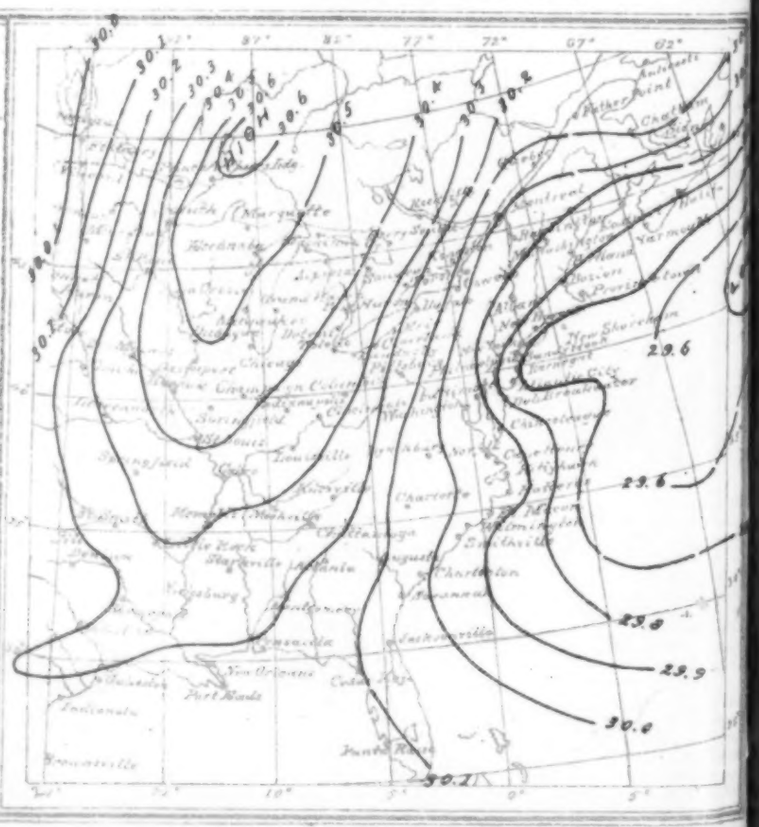
March 13, 1888, 3 P. M.



March 13, 1888, 10 P. M.



March 14, 1888, 7 A. M.



List of voluntary stations of the Signal Service, with their respective observers, from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for March, 1888.

Place of observation and observer.
Alabama.
Livingston, J. W. A. Wright.
New Market, Dr. Geo. D. Norris.
Arizona.
Tucson, Edward L. Wetmore.
Arkansas.
Eureka Springs, A. H. Foote.
Lead Hill, Silas C. Turnbo.
California.
Anderson, Dr. A. Fouch.
Banning, Welwood Murray.
Cahuenga, Seward Cole.
East Pasadena, A. L. Downing.
Georgetown, C. M. Fitzgerald.
Hydesville, E. T. Foss.
Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
Riverside, A. K. Holt.
Salinas, Dr. E. K. Abbott.
Sacramento, S. H. Gerrish.
Santa Barbara, H. D. Vail.
Visalia, John Tuohy.
Willows, David Bentley.
Colorado.
Bennett, I. S. Putnam.
Grand Junction, Frank McClintock.
Connecticut.
Hartford, Wm. R. Matson.
New Hartford, Wm. Goodwin.
Southington, Luman Andrews.
Voluntown, Rev. E. Dewhurst.
Dakota.
Gardiner City, W. C. T. Newell.
Highmore, W. R. McDowell.
Kimball, A. S. Stuver.
Parkston, John J. Swartz.
Richardton, Prof. A. Nordberg.
Webster, Arthur Betts.
District of Columbia.
Kendall Green, Deaf and Dumb Institute.
Receiving Reservoir, Distributing Reservoir, Rock Creek Bridge — Washington Aqueduct.
Florida.
Alva, Chas. E. Robbins.
Archer, Dr. J. C. Neal.
Duke, B. P. Ferrill.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
Limona, J. G. Knapp.
Manatee, Mrs. Mary W. Broberg.
Merritt's Island, Rev. J. H. White.
Tallahassee, Rev. Dr. W. H., Carter.
Georgia.
Athens, Prof. L. H. Charbonnier.
Forsyth, Thos. G. Scott.
Milledgeville, S. A. Cook.
Quitman, J. L. Cutler.
Idaho.
Lewiston, Robert Schleicher.
Illinois.
Charleston, J. B. Dazey.
Jacksonville, P. J. Hasenstab.
Mattoon, Wm. Dozier.
Oswego, John S. Seely.
Palestine, John E. Templeton.
Pekin, Rev. J. E. Terborg.
Riley, John W. James.
Rockford, T. D. Robertson.
Sycamore, Roswell Dow.
Sandwich, Dr. N. E. Ballou.
South Evanston, Dr. M. D. Ewell.
Windsor, A. H. Hatch.
Indiana.
Butlerville, C. F. Hole.
Dana, John S. Wright.
Jeffersonville, J. C. Loomis.
Laconia, Lafe Crozier.
La Grange, R. H. Rerrick.
Logansport, Thos. B. Helm.
Marcy, Elwood Kirkwood.
New Providence, E. S. Hallett.
Sunman, B. F. Ferris.
Vevay, Prof. Chas. Boerner.
Iowa.
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
Auburn, Edwin Miller.
Bancroft, H. N. Renfrew.
Cedar Rapids, H. D. Olds.
Cedar Rapids, F. W. Fleming.
Clarinda, A. S. Van Sandt.
Clear Lake, Dr. J. C. Wright.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
Cromwell, E. E. Harrison.
Denmark, G. B. Brackett.

Place of observation and observer.
Iowa—Con.
Des Moines, Adolphus Voegeli.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
Fort Madison, Miss L. A. McCready.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Independence Emil F. Wülfke.
Iowa City, Prof. A. A. Vebelin.
Logan, Jacob T. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers.
Monticello, H. D. Smith.
Mount Vernon, Prof. Alonzo Collin.
Muscatine, J. P. Walton.
Osage, G. D. Pettingill.
Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd
Oskaloosa, O. H. Avey.
Panora, Harden Bros.
Sac City, Dr. Caleb Brown.
Sac City, Sidney Smith.
Smithland, Dr. Chas. Rice.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Webster City, Elon Lee.
Wesley, Wm. Ward.
West Bend, J. H. Warren.
Kansas.
East Norway, P. L. Gray.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. J. H. Dinsmore, jr.
El Dorado, H. C. Ford.
Globe, Wm. Featherston.
Independence, J. M. Altaffer.
Lawrence, Prof. F. H. Snow.
Manhattan, C. P. Blachley.
Marydale Farm, T. B. Jennings.
Morse, R. P. Edgington.
Ninnescah, E. Shaw.
Salina, J. H. Gibson.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran
Wellington, John H. Wolfe.
Wilson, E. Y. Dollenmayer.
Yates Centre, F. R. Gray.
Kentucky.
Bowling Green, M. H. Crump.
Carlisle, W. H. Fritts.
Frankfort, E. C. Went.
Shelbyville, W. H. Stuart.
Louisiana.
Grand Coteau, Rev. C. M. Widman, S. J.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
Port Eads, Mrs. C. L. Kleimpeter.
Maine.
Bar Harbor, Joseph Wood.
Cornish, Silas West.
Gardiner, Rev. Charles L. Wells.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.
Maryland.
Cumberland, E. T. Shriver.
Fallston, G. G. Curtiss.
Great Falls, Washington Aqueduct.
McDonogh, McDonogh Institute.
Mount St. Mary's, M't St. Mary's College
Woodstock, Woodstock College.
Massachusetts.
Amherst, Miss S. C. Snell.
Amherst, Massachusetts Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observatory, A. L. Rotch.
Cambridge, Harvard College Observatory.
Dudley, Conant Observatory.
Deerfield, Rev. A. Hazen.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Marion, J. E. Hadley.
New Bedford, Thomas R. Rodman.
Newburyport, T. V. Pike.
Provincetown, John R. Smith.
Somerset, Elisha Slade.
Taunton, Dr. E. U. Jones.
Westborough, G. S. Newcomb.
Williamstown, Williams College Observatory.
Worcester, J. B. Hall.
Michigan.
Benton Harbor, A. J. McCave.
Birmingham, S. Alexander.
Hudson, Major A. H. Boles.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Marshall, W. T. Drake.
Mottville, J. A. Hartzler.
Thornville, J. S. Caulkins.

Place of observation and observer.
Michigan.—Con.
Traverse City, S. E. Wait.
Minnesota.
Minneapolis, Wm. Cheney.
Mississippi.
Biloxi, Dr. R. G. Hinsdale.
Palo Alto, W. H. Hill.
Missouri.
Conception, Rev. M. Eckstein.
Fayette, Prof. T. Berry Smith.
Frankford, W. W. Vermillion.
Warrenton, Prof. J. H. Frick.
Montana.
Virginia City, Eugene Stark.
Nebraska.
Brownville, G. D. Carrington.
De Soto, Chas. Seltz.
Fairbury, Dr. J. Humphrey.
Fremont, Rev. L. F. Berry.
Genoa, Geo. S. Truman.
Hay Springs, Wm. Waterman.
Kimball, Wm. G. Barton.
Lincoln, University of Nebraska.
Marquette, John Ellis.
Tecumseh, W. L. Dunlap.
Weeping Water, G. Treat.
Nevada.
Carson City, Chas. W. Friend.
New Hampshire.
Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
Ashland, Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough, — Lake Winipiseogee Cotton and Woolen Manufacturing Co.
New Jersey.
Beverly, C. F. Richardson.
Clayton, W. T. Wilson.
Egg Harbor City, H. Y. Postma.
Moorestown, Thos. J. Beans.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
Vineland, Dr. O. H. Adams.
New Mexico.
Gallinas Spring, J. E. Whitmore.
Las Vegas, F. W. Chatfield.
New York.
Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
Boyd's Corners, Thomas Manning.
Brooklyn, Prof. W. C. Peckham.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Factoryville, T. P. Yates.
Friendship, Jesse D. Rodgers.
Geneva, Mrs. C. K. M. Yates.
Humphrey, Chas. E. Whitney.
Ithaca, Cornell University.
LeRoy, Prof. F. M. Comstock.
Menands, C. B. Tillinghast.
North Volney, J. M. Patrick.
Palmyra, L. D. Cummings.
Penn Yan, Geo. R. Young.
Rose, George Smart.
Saratoga Springs, Felix Thomas.
Setauket, Selah B. Strong.
Starkey, Henry L. Jennison.
Syracuse, J. F. Boynton.
Utica, Thomas Birt.
Vermillion, E. B. Bartlett.
White Plains, Prof. O. R. Willis.
North Carolina.
Chapel Hill, Prof. J. W. Gore.
Hot Springs, Dr. C. F. McGahan.
Lenoir, Dr. R. L. Beall.
Raleigh, Thos. C. Harris.
Statesville, W. A. Eliason.
Weldon, T. A. Clark.
Ohio.
Bellevue, Wm. Sheffield.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Jacksonborough, Dr. J. B. Owsley.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
New Athens, T. M. Sewell.
North Lewisburg, H. D. Gowey.
Portsmouth, Dr. D. B. Cotton.
Ruggles, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.

Place of observation and observer.
Ohio.—Con.
Yellow Springs, Chas. W. Rice.
Oregon.
Albany, John Briggs.
Bandon, Geo. Bennett.
East Portland, Dr. Geo. Wigg.
Eola, Thos. Pearce.
La Grande, J. K. Romig.
McMinnville, Prof. W. J. Crawford.
Yaquina L. H, Dr. John G. Jessup.
Pennsylvania.
Altoona, Chas. B. Dudley.
Blooming Grove, John Grathwohl.
Catawissa, Robt. M. Graham.
Corry, Wm. Loveland.
Drifton, H. D. Miller.
Dyberry, Theo. Day.
Easton, Dr. J. W. Moore.
Germantown, Thomas Meehan.
Grampian Hills, Nathan Moore.
Meadville, David Logan.
Phillipsburg, L. Ray Morgan.
Quakertown, J. L. Heacock.
Reading, C. M. Dechant.
State College, Agricultural Experimental Station, State College.
Troy, M. Gustin.
Wellsborough, Hiram D. Deming.
West Chester, Dr. Jesse C. Green.
Westtown, Wm. F. Wickersham.
South Carolina.
Aiken, Dr. W. H. Geddings.
Cedar Springs, J. T. Bayerly.
Kirkwood, Colin Macrae.
Stateburg, Dr. W. W. Anderson.
Tennessee.
Ashwood, Rev. C. F., Williams.
Milan, Dr. M. D. L. Jordan.
Texas.
Austin, Oscar Samostz.
Cedar Hill, J. P. Berry.
Cleburne, Dr. T. C. Osborn.
Colorado, Fred R. Blount.
Comanche, E. N. Wiesendanger.
Corsicana, W. H. Hamilton.
Decatur, H. D. Donald.
Mesquite, Silas G. Lackey.
New Ulm, C. Runge.
Silver Falls, C. M. Tilford.
Vermont.
Brattleborough, W. H. Childs.
Burlington, W. B. Gates.
Lunenburg, Dr. Hiram A. Cutting.
Manchester, Rev. E. P. Wild.
Middlebury, S. Holton.
Newport, M. B. Thrasher.
Saint Johnsbury, F. Fairbanks.
Strafford, H. F. J. Scribner.
Virginia.
Bird's Nest, C. R. Moore.
Christianburg, H. D. Walters.
Dale Enterprise, L. J. Heatwole.
Marion, A. T. Lincoln.
Petersburg, J. M. Colson.
Rappahannock, W. H. Ireland.
Summit, J. R. Sim.
University of Virginia, James Wearmouth.
Variety Mills, J. H. Micklem.
Wytheville, Howard Shriver.
Washington Territory.
Blakeley, R. M. Hoskinson.
Tacoma, E. N. Fuller.
Vashon, Ferd A. Carpenter.
West Virginia.
Clarksburg, R. T. Lowndes.
Hartmonsville, W. C. Tobb.
Helvetia, Dr. C. T. Stucky.
Middlebrook, S. F. H. Hewit.
Parkersburg, T. G. Field.
Wisconsin.
Beloit, Beloit College Observatory.
Delavan, George L. Collie.
Duester, G. H. Kruschke.
Embarras, J. E. Breed.
Fond du Lac, J. C. Wedge.
Fredonia, B. H. Meyer.
Madison, Washburn Observatory.
Manitowoc, Miss Clasina Lüps.
Prairie du Chien, College of the Scared Heart.
Waucousta, G. H. Yapp.
Foreign.
Grand Turk, W. Indies, Geo. I. Gibbs.
Leon, Mexico, Prof. M. Leal.
Montreal, C. H. McLeod.
New Westminster, B.C., Capt. Adolphus Peele,
Puebla, Mexico, P. H. M. Cappelletti.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for March, 1888.

Alabama.
Mount Vernon B'ks.

Arizona.
Huachuca, Fort.
McDowell, Fort.
Mojave, Fort.

Arkansas.
Hot Springs.

California.
Alcatraz Island.
Angel Island.
Benicia Barracks.
Bidwell, Fort.

California—Con.
Gaston, Fort.
Mason, Fort.
Presidio of San F.

Colorado.
Lewis, Fort.

Dakota.
A. Lincoln, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sisseton, Fort.
Sully, Fort.

Dakota—Con.
Totten, Fort.
Yates, Fort.

Florida.
Staint Francis B'ks.

Idaho.
Boisé Barracks.
Sherman, Fort.

Indian Territory.
Gibson, Fort.
Reno, Fort.
Supply, Fort.

Kansas.
Hays, Fort.
Riley, Fort.

Maryland.
McHenry, Fort.

Michigan.
Brady, Fort.

Minnesota.
Snelling, Fort.

Montana.
Keogh, Fort.
Missoula, Fort.
Shaw, Fort.

Nebraska.
Niobrara, Fort.
Robinson, Fort.
Sidney, Fort.

Nevada.
McDermit, Fort.

New Mexico.
Bayard, Fort.
Selden, Fort.
Union, Fort.
Wingate, Fort.

New York.
Columbus, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburg Barracks.
West Point.

Oregon.
Klamath, Fort.

Texas.
Concho, Fort.
McIntosh, Fort.
Ringgold, Fort.

Virginia.
Monroe, Fort.

Washington Ter.
Spokane, Fort.
Townsend, Fort.
Walla Walla, Fort.

Wyoming.
Laramie, Fort.
McKinney, Fort.
Sheridan, Camp.
Washakie, Fort.

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for March, 1888.

Alabama, P. H. Mell, jr., Signal Corps, director, Auburn, Ala.
Arkansas, Prof. John C. Branner, director, Little Rock, Ark.
Colorado, Prof. F. H. Loud, director, Colorado Springs, Colo.
Illinois, Col. Charles F. Mills, director, Springfield, Ill.
Indiana, Prof. H. A. Huston, director, Lafayette, Ind.
Kansas, Prof. J. T. Lovewell, director, Topeka, Kans.
Louisiana, R. E. Kerkam, Sgt., Signal Corps, director, New Orleans, La.
Michigan, N. R. Conger, Sgt., Signal Corps, director, Lansing, Mich.
Minnesota, Prof. W. W. Payne, director, Northfield, Minn.
Mississippi, Prof. R. B. Fulton, director, University, Miss.
Missouri, Prof. F. E. Nipher, director, Saint Louis, Mo.
Nebraska, Prof. G. D. Swezey, director, Crete, Nebr.
Nevada, Prof. Chas. W. Friend, director, Carson City, Nev.
New England, Prof. W. H. Niles, President, Boston, Mass.
New Jersey, Prof. George H. Cook, director, New Brunswick, N. J.
North Carolina, Dr. Herbert Battle, director, Raleigh, N. C.
Ohio, Prof. Benj. F. Thomas, director, Ohio State University, Columbus, Ohio.
Oregon, B. S. Pague, Sgt., Signal Corps, Roseburg, Oregon.
Pennsylvania, under direction of Franklin Institute, Philadelphia, Pa.
South Carolina, Hon. A. P. Butler, director, Columbia, S. C.
Tennessee, J. D. Plunket, M. D., director; H. C. Bate, assistant, Nashville, Tenn.

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